4-4-1

MASTERPLAN LIMITED

Planning and Development Advisors

領賢規劃顧問有限公司

Your Ref: Y/I-DB/3

28 November 2016

The Secretariat
Town Planning Board
15/F, North Point Government Offices
333 Java Road, North Point
Hong Kong

By Hand

Dear Sir,

Section 12A Application No.Y/I-DB/3
For Optimising Land Uses at Area 10b, Discovery Bay
Further Information

I refer to the abovementioned application which is currently being processed.

Further to our second response to departmental comments dated 26 October, we are writing to provide further information in support of the technical feasibility of the application. Please find the enclosed revised Environmental Study (Chapter 6-8, and new changes highlighted in blue) and its revised Appendix 6.3 – Preliminary Water Quality Assessment (changes highlighted in yellow), for your consideration.

In summary, the further information relates to the following issues:

1. Clarification that the 1,100 m^3/day of sewage accounts for the residential population within the proposed development, there is no commercial activities planned within the site.
2. The receiving water quality of the effluent discharge of the proposed on-site Sewage Treatment Works, to ensure increase in Total Inorganic Nitrogen (TIN), is minimised.
3. The modelling scenarios of effluent dispersion, and its sensitivity tests.

The additional 1,100m^3/day sewage generated by the proposed residential development is now proposed to be catered by a new Sewage Treatment Works which would be implemented by the Applicant.

Yet in view of the various on-going new developments at North Lantau and Airport, Water Supplies Department and Environmental Protection Department may consider for expansion of the Siu Ho Wan water and sewerage treatment facilities in order to provide extra water supply and sewage treatment capacity. The Applicant believes that, should WSD and EPD plans for infrastructure expansion, all proposed future developments in the vicinity areas, including those in the Discovery Bay, should be considered on equal and fair basis. In addition, the proposal for Area 6f is moderate in scale, the demand on the overall Government infrastructure would be insignificant. Therefore, the Applicant requests WSD and EPD to take into account the proposed development should they consider for future expansion of the Sui Ho Wan facilities.

Room 3516B, 35/F, China Merchants Tower, Shun Tak Centre, 200 Connaught Road Central, Hong Kong.
Tel: (852) 2418 2880 Fax: (852) 2587 7068 Email: info@masterplan.com.hk

This information clarifies and supplements the application, and does not constitute a material change identified in Town Planning Board's Guideline No.32. It is consistent with the Guideline.

Yours faithfully,

Cynthia Chan
For and on behalf of
Masterplan Limited

Enc
cc. DPO/SKI (Attn: Helena Pang) Email
Client & Consultants

MASTERPLAN LIMITED
Room 3516B, 35/F, China Merchants Tower, Shun Tak Centre, 200 Connaught Road Central, Hong Kong.
Tel: (852) 2418 2880 Fax: (852) 2587 7068 Email: info@masterplan.com.hk

6 Water Quality Assessment

6.1 Description of the Environment

6.1.1 Existing Water Environment

6.1.1.1 The project sites fall within the Southern Water Control Zone (WCZ) and are located at Discovery Valley at east Lantau, downstream of Lo Fu Tau and Discovery Bay Reservoir. Tai Pak Wan, a non-gazetted beach, is within the boundary of Discovery Bay. Besides, a Coastal Protection Area is located at the northern edge of Tai Pak Tsui Peninsula to conserve the natural coastline.

6.1.1.2 Area 10b is located at the seawall in the southwest side of Tai Pak Tsui Peninsula. Nim Shue Wan adjoins the southern boundary of Area 10b and the water current in Nim Shue Wan is generally calm. Surface runoff from existing land area is discharged into Nim Sue Wan.

6.1.2 Existing Sewerage System

6.1.2.1 Discovery Bay has been implemented with a sewerage system to collect all the sewage and wastewater generated from daily activities. All the existing sewage and wastewater collected from the sewerage system is diverted to Siu Ho Wan Sewerage Treatment Works via pumping stations and the outfall is located at north Lantau which is far away from Discovery Bay.

6.1.3 Water Quality Sensitive Receivers

6.1.3.1 A review has been conducted to identify the Water Quality Sensitive Receivers (WSRs) in the vicinity that may be impacted by the potential development area. The following table summarizes these WSRs and they are illustrated in **Figure 6-1**. The relevant legislation and standards related to water quality are summarised in **Appendix 6.1**.

Table 6.1 Water quality sensitive receivers

Water Sensitive Receivers [1]	Description
WSR01 – Discovery Bay Reservoir	Primary reservoir for flushing, located upstream of the potential development areas
WSR 02 – Discovery Bay Reservoir Spillway and	Spillway from Discovery Bay Reservoir and the tributaries, chainage runs along Discovery Valley Road and downstream to

Water Sensitive Receivers [1]	Description
Tributaries	Tsoi Yuen Wan
WSR03 – Nim Shue Wan Stream	Natural stream downstream from the existing golf course to Nim Shue Wan
WSR04 – Tai Pak Wan	Non-gazetted beach downstream to Discovery Bay Reservoir Spillway
WSR05 – Hai Tei Wan Marina	Marina at Hai Tei Wan next to Discovery Bay Road
WSR 06 – Nim Shue Wan	Nim Shue Wan
WSR07 – Tai Pak Tsui Peninsula Coastal Protection Area (CPA)	Protected natural shoreline at north of Tai Pak Tsui Peninsula

Note:
[1] The nearest water gathering ground is located at 5.6 km away

6.2 Identification and Evaluation of Environmental Impacts during Construction Phase

6.2.1 Pollution Sources

Site Runoff

6.2.1.1 During rainstorm events, construction site runoff would come from all over the works site. These surface runoff might be polluted by:

- Runoff and erosion from site surfaces, earth working areas and stockpiles;
- Wash water from dust suppression sprays and wheel washing facilities; and
- Chemicals spillage such as fuel, oil, solvents and lubricants from maintenance of construction machinery and equipment.

6.2.1.2 Construction runoff may cause physical, biological and chemical effects. The physical effects include potential blockage of drainage channels and increase of suspended solid levels in the Southern WCZ. Runoff containing significant amounts of concrete and cement-derived material may cause primary chemical effects such as increasing turbidity and discoloration, elevation in pH, and accretion of solids. A number of secondary effects may also result in toxic effects to water biota due to elevated pH values, and reduced decay rates of faecal micro-organisms and photosynthetic rate due to the decreased light penetration. All the best practices will be implemented to reduce and minimise the generation of construction run-off.

Sewage from Workforce

6.2.1.3 Sewage effluents will arise from the sanitary facilities provided for the on-site construction workforce. According to Table T-2 of Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning, the unit flow is 0.15 m^3/day/employed population. The characteristics of sewage would include high levels of BOD_5, Ammonia and *E. coli* counts. Since sufficient portable chemical toilets and sewage holding tanks will be provided, no adverse water quality impact is anticipated.

Construction of Decking-Over Piles Along Waterfronts

6.2.1.4 The low-rise residential buildings in Area 10b will be constructed on the southwest seashore of Tai Pak Tsui Peninsula adjoining Nim Shue Wan (WSR04) and the entrance of Hai Tai Wan Marina (WSR03). As discussed in **Section 2**, the existing seafront would be expanding by a width of 9-34m. According to the latest design, in order to minimize hydrodynamic and water quality impact, the new platform along the coastline would be constructed by decking-over piles and only minor modification works would be required for the existing seawall, including relocation of existing piers, will need to be conducted below water level, and the details will be established in the detailed design stage. To avoid/minimise water quality impacts due to the piling works, steel casings will firstly be installed at the proposed pile locations. The steel casings extend above the sea and will prevent soil or rock arisings from being disposed of into the sea. The arisings will be removed from within the piles to a barge anchored close to the piles. Once the materials inside the casings were removed, steel reinforcements/structural sections will be lowered inside the casing and then followed by concreting work. To control the sediment plume that may be dispersed to nearby WSRs during seabed disturbance, environmental friendly construction methods such as installing silt curtains should be considered. However, further studies would need to be conducted to determine the size and spacing of the piles etc.

Dredging

6.2.1.5 It may be necessary to conduct some dredging to facilitate marine access for the future berths (eg for the Bounty). The tentative extent of dredging for navigation of vessels is shown in **Figure 6-1**. Preliminary estimation suggests that the total amount of dredging would be less than 100,000m^3. The dredging process would require appropriate mitigation

measures to control the dispersion of the sediment plume, such as installing silt curtains. The proposed navigation channel required dredging works is shown in **Figure 6-1**.

Wastewater from Decontamination Works

6.2.1.6 As the existing site comprises bus repair workshop, boat servicing yard, etc. should land decontamination works be carried out during construction phase of this area, the method for handling and disposal of wastewater contaminated with chemical waste should be addressed. As a general site practice of soil decontamination works (i.e. Stabilization/ Solidification or Biopile), impermeable sheeting should be used to cover stockpiles of the treated soil to prevent dust and runoff. Concrete bunds surrounding the treatment area should also be implemented to collect the possible spillage or leachate generated and recycled back to the treatment. In case there is any sign of excess leachate present within the site, the excess leachate should be diverted to a designated storage area for temporary storage and collected by a licensed chemical waste collector.

6.3 Recommended Mitigation Measures during Construction Phase

6.3.1 General Construction Activities the Potential Development Area

Site Runoff and Sewage from Workforce

6.3.1.1 Given the relatively small amount of site formation work for Area 10b, the water quality impacts during construction phase is not anticipated. Nevertheless, standard good site practices such as perimeter cut off drains, silt removal facilities, temporary toilet etc. would still be required. For site runoff, perimeter cut off with internal drainage works and erosion and sedimentation control facilities around the site area shall be implemented. Channels, earth bunds and sand bag barriers would also be provided on site to direct storm water to silt removal facilities. In addition, the design of temporary on-site drainage should prevent runoff going through site surface, construction machinery and equipment to avoid polluted runoff. Sedimentation tanks with sufficient capacity should also be provided as mitigation measure for settling surface runoff prior to disposal. Also, discharge into the marina will be avoided. With the implementation of the above mitigation measures, it

is anticipated that the impacts from discharge of site runoff / wastewater is not insurmountable. A comprehensive list of those standard measures is given in **Appendix 6.2**.

6.3.1.2 During the construction works for the platform along the waterfront of Area 10b, open sea dredging would be avoided and a deck will be constructed over piles. As compared to the conventional reclamation process that would demand dredging, the current methodology would have avoided the release of significant amount of sediment which may have certain impacts on the neighbouring WSRs. The following good practice shall apply for the construction of piles and dredging works for the navigation channel.

- Install efficient cage-typed silt curtains, i.e. at least 80% SS reduction, at the point of dredging/filling to control the dispersion of SS;
- Water quality monitoring should be implemented to ensure effective control of water pollution and recommend additional mitigation measures required;
- The descent speed of grabs should be controlled to minimize the seabed impact and to reduce the volume of over-dredging; and
- All vessels should be sized so that adequate clearance is maintained between vessels and the seabed in all tide conditions, to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.

6.4 Identification and Evaluation of Environmental Impacts during Operational Phase

6.4.1.1 EPD advised in May 2015 that the design capacity of the SHWSTW has been allocated for the treatment of the sewage arising from the development of the Expansion of Hong Kong International Airport into a Three Runway System, the new town development under Tung Chung New Town Expansion and the Penny's Bay Phase 2 development, etc. Therefore, SHWSTW has no spare capacity to cater for the sewage arising from any proposed Discovery Bay further development and the Sewerage Authority has no plan to increase the design capacity of the SHWSTW in the short and medium terms.

6.4.1.2 Therefore, the current proposal is to receive the additional sewage from Area 10b, a new sewage treatment plant within Discovery Bay would need to be commissioned. A discharge license will be obtained under the WPCO prior to discharge. The design flow rate of the proposed new sewage treatment plant would be around 1,100 m^3 per day (i.e.

based on an approximate population of 2,900 for Area 10b and each has a flow rate of 370L/day (ADWF) and hence around 1,080m^3/day in total as per EPD's Technical Paper Report No. EPD/TP1/05-Guidelines for Estimating Sewage Infrastructure Planning (GESF)). A tentative marine outfall is proposed as shown in **Figure 6-1** near Area 10b. The peaking hourly flow rate would be approximately 75L/s according to table T5 of GESF by adopting a peak factor of 6. The details of effluent standard has been presented in Annex E Technical Note - Preliminary Water Quality Assessment.

6.4.1.3 Secondary or tertiary treatment such as Membrane Bioreactor (MBR) would be implemented in the proposed sewage treatment works if the new marine outfall is located at a location near to the shore. The outfall location will be determined during the detailed design stage without affecting the land use compatibility. Nevertheless, the current tentative location is located at the area where the water depth is deeper and the current is stronger. It is also at around 300m from the marina and at least 6km from the fish culture zone in Cheung Sha Wan and Ma Wan. Besides, the current tentative location is 1.3km away from Tai Pak Wan where, although not a gazetted beach, many people uses that for recreational uses. This additional effluent would have impacts on both water quality and marine ecology. However, with the implementation of suitable treatment method, it is anticipated that the discharge from the sewage treatment works would meet the criteria of WPCO.

6.4.1.4 A preliminary water quality impact assessment has been conducted for the tentative marine outfall (see **Appendix 6.3**). The assessment indicates that the water quality in the vicinity of the marine-based WSRs would be in compliance with Water Quality Objectives (WQOs) in suspended solid, *E. coli* and unionised ammonia. Although exceedance of Total Inorganic Nitrogen (TIN) under WQO is observed, the contribution of the high TIN level is due to the background from Pearl River estuary. Any emergency discharge can be readily mitigated by implementing suitable standby measures and back-up retention facilities to be developed during detailed design stage.

6.4.1.5 The platform along the waterfront will be supported by decking over piles with a narrow strip of approximately 9-34m only. The pile arrays will be generally along flow directions and will not block any major flow streamlines within Nim Shue Wan (WSR04). Thus, hydrodynamic impact and the associate change to water quality regime is unlikely to be significant. However, a quantitative water quality model shall be

conducted to determine the cumulative impact to quantify any changes in hydrodynamic and water quality regime. The water quality model shall also be used to study the possible impacts due to the increased surface runoff into Nim Shue Wan, and options of the design of the decks and piles (ie. in terms of size and spacing of the piles) and the design of any sewage treatment works and outfall as required.

6.4.2 Mitigation Measures

6.4.2.1

The following contingency measures are proposed in case of any emergency discharge:

Sewage Pumping Stations:

- 100% standby pump capacity
- Stockpile a spare pump of 50% pumping capacity
- Dual feed power supply
- Emergency storage within pumping station equivalent to 6 hours of average dry weather flow
- Emergency communication mechanism amongst Government departments.

Rising Mains:

- Concrete surrounding to the twin rising mains

6.4.2.2

The following initial measures can be considered as mitigation to control the emergency overflows from the Sewage Treatment Work thereby polluting the stream and the receiving water bodies at Discovery Bay:

- Provide an emergency overflow pipe from the proposed STW at Area 10b to existing sewage pumping station no. 1 (SPS1) located at the junction of Discovery Bay Road and Discovery Bay Valley Road. During emergency situation, sewage from the STW can overflow to the existing Discovery Bay sewerage network that pumps sewage flows to Siu Ho Wan Sewage Treatment Work
- Dual feed power supply for the Sewage Treatment Work
- Suitable backup of treatment process in the Sewage Treatment Work.

6.5 Conclusion

6.5.1.1 The potential issues that may arise during both the construction and operational phases have been identified. While a number of issues has been considered by implementing good design (eg. decking over instead of conventional reclamation), a quantitative water quality model shall be concluded at detail assessment to refine the design and construction methodology so as to minimise any impacts as much as practicable. During operational phase, sewage generated will be treated in a new sewage treatment work. According to the results from the water quality assessment, most of the pollution concentration would comply with relevant criteria. For TIN, the background concentration has exceeded the WQO already. The discharge concentration has therefore been reduced as much as practicable to ensure that the increase in TIN is minimised. The assessment results should also be adopted to evaluate the need for mitigation measures required. Any emergency discharge can be mitigated by implementing suitable standby measures and contingency measures to be developed during detailed design stage. Initial mitigation measures would also be provided to control the emergency overflows.

7 Other Aspects

7.1 Review of Waste Management Issues

7.1.1.1 As mentioned in **Section 2**, the potential development at Area 10b of Discovery Bay include residential premises together with the necessary infrastructure and landscaping elements. A podium structure would be built to cover the existing maintenance activities. In order to cater for the additional residential development, an additional narrow strip of reclamation would be proposed in form as a decking with a width of 9.34m.

7.1.1.2 Although the construction methodologies are yet to be developed in subsequent detail design stage, the construction and reclamation work would adopt an environmentally friendly approach. With the implementation of good site practices and waste reduction measures, the quantity of construction of demolition waste is estimated to be around 29,000 m^3.

7.2 Review on Land Contamination Issues

7.2.1.1 A desktop review has been conducted by studying the previous aerial photos for the concerned areas for the potential development area. These photos have provided useful information to ascertain any historical land uses that may have potential for land contamination. The relevant legislation and standards relating to land contamination is given in **Appendix 7.1** and the related historic aerial photos is given in **Appendix 7.2**. The following table summarises these findings.

Table 7.1 Summary of historical aerial photographs for Area 10b

Year	Description
1973	• Mainly nature terrain and coastline with a number of villages scattering around. • No signs for industrial developments
1982	• Reclamation works in Area 10b were in progress. • The seawall in the marina was formed
1993	• Most of the site formation work and reclamation works had been completed. • The scale of the marina was less than that currently being operated.
2012	• Not much difference to that in 1993 except the scale of the marina was larger than that in the 90's.

7.2.2 Description of Environment

7.2.2.1 Site surveys were conducted between May and June of 2014 to ground truth the findings from desktop review to identify any land uses within the potential development area that may have the potential for contamination in soil and groundwater. Photos taken during the site inspection showing the land uses within each of the area are given in **Section 3**. The following paragraphs summarises the findings from the surveys.

7.2.2.2 The area within Area 10b is currently occupied by a number of services facilities including the depot for vehicles, petrol / LPG filling station, staff quarters, Kaito etc. The areas within those depot, petrol / LPG filling stations are paved with concrete. Some of these area may have storage for dangerous goods as well. According to the EPD's Guidance Note for Contamination Land Assessment and Remediation, these land uses have the potential for land contamination.

7.2.3 Identification of Potentially Contaminated Areas

7.2.3.1 As discussed in the above sections, locations where land contamination would be more likely would be the depot for buses and golf cars and petrol / LPG filling stations.

7.2.3.2 According to the EPD's *Guidance Note for Contaminated Land Assessment and Remediation* (GN), project proponents and professionals responsible for major works or re-development on sites associated within industrial operations listed in the GN (including depot and LPG filling stations) should, before commencement of any works, carry out a site assessment to determine whether the site is contaminated and assess the extent of any contamination and, if necessary, implement proper remedial measures to restore the land to an acceptable condition for its intended purpose.

7.2.3.3 For the purpose of this study, it is recommended a Contamination Assessment Plan (CAP) to be prepared after the rezoning approval and prior to implementation. The CAP shall cover the whole potential development area and would recommend the need for Site Investigation (SI) to collect soil and ground water samples for analysis, and any subsequent actions, as per the statutory requirements.

7.2.3.4 Following the completion of environmental SI and lab testing works, the project proponent would prepare the Contamination Assessment Report (CAR) which would present the findings of the SI and evaluate the level and extent of potential contamination. The potential environmental and human health impact based on the extent of potential contamination identified would also be evaluated.

7.2.3.5 If land contamination is identified during the proposed environmental SI and remediation is required, a Remediation Action Plan (RAP) will be prepared. The objectives of RAP are:

- To undertake further site investigation where required;
- To evaluate and recommend appropriate remedial measures for the contaminated materials identified in the assessment;
- To recommend good handling practices for the contaminated materials during the remediation works;
- To recommend approximate handling and disposal measures; and
- To formulate optimal and cost-effective mitigation and remedial measures for EPD's agreement.

7.2.3.6 A Remediation Report (RR), if required, would also be prepared to demonstrate that the clean-up works are adequate. No construction / development works would be carried out within the potentially contaminated areas prior to the agreement of the RR with EPD.

7.2.4 Conclusion

7.2.4.1 An initial land contamination appraisal has been conducted to identify any locations within the potential development area that may have the potential for contamination in soil and groundwater. The appraisal mainly includes a review of the desktop information and supplemented with site surveys.

7.2.4.2 Based on the findings at this stage, the depot area and petrol / LPG filling stations within Area 10b have been identified as potential locations for contamination. For the purpose of this report, it is recommended that a CAP to be prepared after the rezoning approval and prior to implementation. Where necessary, environmental site investigation shall be conducted to collect soil and groundwater samples to confirm the presence of any contamination, and any subsequent actions.

7.3 Review on Ecological Issues

7.3.1.1 As discussed in **Section 1**, the potential development area have been included in the approved Discovery Bay Master Plan 6.0E7h(a), and has been permitted to development, some being implemented, despite the fact that some of the planning parameters would need to be amended. For those area included in the approved Master Plan, site clearance and formation work could be commenced to implement the development parameters in the approved Master Plan.

7.3.1.2 Reclamation and dredging works are proposed for the development at Area 10b. However, the extent of reclamation and dredging will be within the boundary of the boundary approved under the Foreshore and Seabed Ordinance in 1977. Hence, by virtue of Clause 9(2)(c) of the EIAO, the reclamation and dredging works are exempted from the EIAO.

7.3.1.3 As discussed in **Section 1.3.5.1**, depending on the future discussion with DSD, there may be a need for a new sewage treatment plant for Area 10b. The effluent discharge would have certain impact on marine ecology. Similarly, the dredging works for the marine navigation channel would also inevitably generate sediment plume which would have certain impacts in marine ecology.

7.3.1.4 Together with suspected presence of species of conservation concern in Nim Shue Wan, such as Seagrass and Coral, marine ecological impacts are anticipated. Under such circumstances, series of mitigation measures have been recommended in **Section 6.3**, including the installation of silt-curtain and controlling of descent speed of grab for the marine construction works and the pile of the deckover would be designed to avoid blocking any flow streamline during the operational phase.

7.3.1.5 The nearest fish culture zones (FCZs) are Cheung Sha Wan and Ma Wan which are located at more than 6.5 km and 6 km away respectively. Given these large separation distance, together with the use of deck-

over approach for the reclamation and mitigation measures such as silt curtains, both direct and indirect impacts are considered insignificant

7.3.1.6 Similarly, for the capital dredging of the new navigation channels, good measures including the use of silt curtains would be adopted. Hence, adverse direct and indirect impacts are not considered significant

7.3.1.7 In terms of terrestrial ecology, the impacts, if any, associated with tree felling is anticipated to be minor due to the developed nature of Area 10b. Where practical, opportunities for transplantation have been explored, where the trees which have been identified as having a good transplantation survival rate. In addition, a number of trees have been proposed to be retained.

7.3.1.8 In total, 169 trees have been identified within Area 10b that would be felled. None of the trees identified with Area 10b are considered to be rare or of conservation value. The trees to be felled all form parts of small groups or are single standalone trees. As such, the trees are considered to be of low ecological value.

7.3.1.9 In addition, a minor bottom part of the slope greenery interfacing the proposed development would be affected. However, the trees are not native nor significant species. Moreover, the majority of the sloop greenery would not be affected and would continue to function as a terrestrial ecology. Due considerations would be given to the location, dimensions and the area of the proposed development to avoid impact to the slope greenery. Compensatory planting would also be provided.

7.3.1.10 As discussed in **Section 6.4.1.4**, a new sewage treatment plant will be built to receive and treat the sewage generated from the additional population from Area 10b. The treated sewage would then be discharged to a new marine outfall in **Figure 6-1**. According to the results from the supplementary water quality assessment (**Appendix 6.3**), most of the pollution concentrations would comply with relevant criteria. For TIN, the background concentration has exceeded the WQO already. The discharge concentration has therefore been reduced as much as practicable to ensure that the increase in TIN is minimised

8 Conclusion

8.1.1 An environmental assessment has been conducted to review the potential development area, Area 10b, for Discovery Bay. Key aspects that have been assessed include air quality, noise and water quality. Potential issues on land contamination and ecology have also been reviewed. Those relating to sewerage and drainage, and water supply are separately presented in another report.

8.1.2 All the relevant noise and air quality emission sources in the vicinity that would have impacts on the proposed developments have been identified and assessed. The strength of these sources have been established by measurement or from best available information and subsequently included in the assessment. Results indicate that the noise and air quality impacts on planned developments would comply with the relevant noise criteria and hence further mitigation measures are not required. The need for any additional mitigation measures for the bus depot shall be subjected to the subsequent statutory EIA.

8.1.2.1 Although most of the development would not involve major marine works, some minor reclamation work and dredging work would still be required for Area 10b. By adopting a non-dredged approach such as decking over piles and other good site practices, any release of sediment would be readily controlled and would have been minimised. The need for any additional mitigation measures shall be subject to the findings from the detailed cumulative impact assessment to be conducted as part of the subsequent statutory EIA.

8.1.2.2 Depending on future discussion with DSD, a sewage treatment work may be required and further details including location of marine outfall will be determined during the subsequent statutory EIA where applicable.

8.1.2.3 Sewage generated during operational phase will be treated in a new sewage treatment plant and discharged into the marine pipeline leading to the marine outfall at sea bottom near Area 10b. According to the results from the supplementary water quality assessment, most of the pollution concentrations would comply with relevant criteria. For TIN, the background concentration has exceeded the WQO already. The discharge concentration has therefore been reduced as much as practicable to ensure that the increase in TIN is minimised. Any emergency discharge can be mitigated by implementing suitable

standby measures and contingency measures to be developed during detailed design stage. Initial mitigation measures would also be provided to control the emergency overflows.

8.1.2.4 Potential for land contamination due to the operation of the existing bus depot and services area has been identified. Further investigation should be conducted after the rezoning and prior to implementation to collect soil and water samples as required, and hence any subsequent remediation actions to fulfil the statutory requirements.

8.1.2.5 Depending on the need and design of the sewage treatment works and dredging works for the outfall, and dredging works for any navigation channel outside the reclamation area, subsequent statutory EIA may be required to further investigate any potential environmental impacts.

Appendix 6.3

Preliminary Water Quality Assessment

1 Introduction

1.1.1.1 This technical note is prepared for supporting the Section 12A Application No. Y/I-DB/3 of rezoning the permissible use from "Other Specified Use" ("OU") and "Government, Institution and Community" for various supporting service uses to "OU" (Residential and various supporting service uses) R(C)13 at Area 10b. It summarises the results of preliminary water quality impact assessment for the proposed sewage treatment works (STW) in Area 10b to the water sensitive receivers during operational phase.

1.1.1.2 The proposed STW will be established to receive and treat the sewage generated from Area 10b which will accommodate a total of about 2,800 additional population. The Average Dry Weather Flow (ADWF) of the proposed STW is approximately 1,100 m^3/day. Nitrogen removal and disinfection will be implemented into the proposed STW. As discussed in Study on Sewerage accompanying the Planning Statement of Area 10b, the treated effluent from the proposed STW would be conveyed to a sewerage system, and finally discharged via a submarine outfall. Mitigation measures will be proposed as necessary to achieve compliance of Water Quality Objectives (WQOs).

2 Baseline Condition

2.1 Marine Water Quality

2.1.1.1 The WQOs include various parameters, which describe the physical, chemical and biological properties of the marine environment. **Table 2.1** summarises the key baseline conditions of SS (suspended solids), *E. coli*, UIA (Un-ionized Ammonia Nitrogen) and TIN (Total Inorganic Nitrogen) at EPD's marine monitoring location SM10 from year 2005 to 2014. The annual average of the baseline condition at SM10 from year 2005 to 2014 is presented in **Appendix A**. It should be noted that the baseline TIN level (0.35 mg/L) already exceeds the WQO of 0.1 mg/L in Southern Water Control Zone (WCZ), due to high TIN level in the background of Pearl River estuary[1].

Table 2.1 Baseline condition of EPD's marine monitoring station SM10 from year 2005 to 2014

SS (mg/L)	*E. coli* (counts/100ml)	UIA (mg/L)	TIN (mg/L)
6.92	8	0.0042	<u>0.35</u>

Notes:

[1] EPD Marine Water Quality in Hong Kong in 2014.

[1] Unless otherwise specified, data presented are depth averaged and are the annual arithmetic mean except for *E. coli* which is in geometric mean.
[2] Underlined indicates occurrence of non-compliance with that parameter of WQO.

3 Water Sensitive Receivers

3.1.1.1 Water sensitive receivers (WSRs) have been identified and are shown in **Figure 3.1**. The treated effluent from the STW in Area 10b would be conveyed to the planned sewerage system, and eventually discharged to the marine outfall near Nim Shue Wan.

3.1.1.2 The distances between the discharge point of the marine outfall and WSRs are listed in **Table 3.1**. The nearest WSR is Hai Tei Wan Marina (WSR 05) at 320m.

Table 3.1 Description of water sensitive receivers within 2500 meters

WSR	Name	Description	Distance from the discharge location (m)
WSR01	Discovery Bay Reservoir	Primary reservoir for flushing, located upstream of the potential development areas	-[1]
WSR02	Discovery Bay Reservoir Spillway and Tributaries	Spillway from Discovery Bay Reservoir and the tributaries, drainage runs along Discovery Valley Road and downstream to Tsoi Yuen Wan	-[1]
WSR03	Nim Shue Wan Stream	Natural stream downstream from the existing golf course to Nim Shue Wan	-[1]
WSR04	Tai Pak Wan	Non-gazetted beach downstream to Discovery Bay Reservoir Spillway	2500
WSR05	Hai Tei Wan Marina	Marina at Hai Tei Wan next to Discovery Bay Road	320
WSR06	Nim Shue Wan	Nim Shue Wan Beach	650
WSR07	Tai Pak Tsui Peninsula Coastal Protection Area (CPA)	Protected natural shoreline at north of Tai Pak Tsui Peninsula	1600

Note:
[1] Inland WSR.

4 Assessment Methodology

4.1 Effluent Discharge Standards

4.1.1.1 **Table 4.1** shows the effluent discharge standards of the proposed STW.

Table 4.1 Effluent discharge standards of the proposed STW

Parameters	Discharge standard provided by sub-contractor (Flow rate estimated as 600 m³/day)
pH	6-10
Temperature	< 30°C
Colour	< 1 lovibond units
Suspended Solids (SS)	30 mg/L
5-Day Biochemical Oxygen Demand (BOD_5)	20 mg/L
Chemical Oxygen Demand (COD)	< 80 mg/L
Oil & Grease	< 10 mg/L
Total phosphorus	2 mg/L
Ammonia Nitrogen	8 mg/L
Nitrate + nitrite nitrogen	12 mg/L
Surfactants	< 15 mg/L
E. coli	10 count/100ml

Note:
[1] Mercury, Cadmium, Cyanide, Phenols, Sulphide, Sulphate, Chloride, Fluoride, Iron, Boron, Barium and other toxic metals are not the major pollutants in the domestic sewage and are excluded in the comparison.

4.2 WQOs in Southern WCZ

4.2.1.1 **Table 4.2** shows the criteria of SS, *E. coli*, UIA, and TIN under WQOs in Southern Water Control Zone. As discussed in **Section 2**, the baseline TIN level has already exceeded the WQO criterion of 0.1 mg/L.

Table 4.2 WQOs Criteria in Southern WCZ

SS [2] (mg/L)	*E. coli* (counts/100ml)	UIA (mg/L)	TIN (mg/L)
8.99	180/610[1]	0.021	0.1

Note:
[1] The criteria for *E. coli* are 610 counts/100ml for Secondary Contact Recreational Subzones, and 180 counts/100ml for bathing beaches in wet season.
[2] SS criteria is established based on WQO that water discharge shall not cause the natural ambient level to be raised by 30% for marine water WCZ.

4.3 Design of Proposed Marine Outfall

4.3.1.1 **Table 4.3** shows the tentative details of proposed marine outfall. These assumptions would be further refined and developed during the detailed design stage.

Table 4.3 Tentative design details for the diffuser in the proposed marine outfall

Parameters	Description
No. of discharge ports in the diffuser	8
Design discharge speed at the port	1 m/s
Length of diffuser base	10m
Configuration of discharge ports	Each discharge ports are distributed evenly on the diffuser line. The ports are pointing horizontally with alternating directions.
Location of the diffuser/discharge outfall	Approximately 300m offshore[1]
Depth of the discharge port	4.5m from water surface (at sea bottom)

Note:
[1] The outfall location is also tentatively set at a location with a water depth of approximately 4.5m. The location would be further refined during the detailed design stage.

4.4 Modelling Scenario

4.4.1.1 The effluent dispersion scenarios are simulated by a near-field model, CORMIX. The key inputs to the CORMIX include outfall configuration, ambient current speed, vertical density profile and effluent flow rate.

4.4.1.2 [redacted]

4.4.1.3 Ambient velocities at 0.013 m/s ([redacted]), 0.042 m/s ([redacted]) and 0.076 m/s ([redacted]) have been estimated from the approved Delft 3D modelling results from HATS Stage 2A EIA (AEIAR-121/2008), [redacted] are presented in **Appendix B.**

4.4.1.4 [redacted]. To cater for the different tidal conditions, the following scenarios have been modelled under CORMIX:

- The 90 percentile of ambient velocity of 0.076 m/s. Under this scenario, the effluent discharge flow is in the same direction as the ambient flow. The pollutant plume is then flowing towards the WSR by the maximum ambient flow.
- The 50 percentile of ambient velocity of 0.042 m/s. Under this scenario, the effluent discharge flow is in the same direction as the ambient flow. The pollutant plume is then flowing towards the WSR by the average ambient flow.
- The 10 percentile of ambient velocity of 0.013 m/s. Under this scenario, the ambient velocity is near stagnant. The dispersion of the plume is dominated by diffusion.

4.4.1.5 **Table 4.4** presents the modelling parameters of the worst case scenario for ambient in co-flow situation.

[redacted]

Table 4.4 Modelling scenario and corresponding parameters for the model

Parameter		Scenario	
Season		Dry	Wet
Effluent Discharge Parameters	Total Discharge Flow Rate	1 m/s[1]·1100m³/day	
	Concentration of Effluent at Peak Flow	NH_3-N: 8 mg/L (UIA[2]: 0.424 mg/L) SS: 30 mg/L *E. coli*: 10 counts/100ml TIN[3]: 12 + 8 mg/L	
	Effluent Density	1000 kg/m	
	Discharge height above bottom	0 m (sea bottom)	
Ambient Conditions	Ambient Velocity	Ambient flow of 10, 50 and 90 percentile at 0.013, 0.042 and 0.076 m/s respectively (See **Appendix B**) with 90 deg of diffuser line	
	Ambient Density [5]	Surface 1,022 kg/m³; Bottom 1,022 kg/m³	Surface 1,017 kg/m³; Bottom 1,017.7 kg/m³
	Water Depth	4.5 m [6]	
	Wind speed	2 m/s [4]	

Note:

[1] Reference to the designed effluent velocity of the proposed marine outfall discharging to sea.

[2] UIA is estimated by multiplying a percentage factor to NH3-N. This factor depends on temperature and pH. The average temp and pH from EPD water quality monitoring stations in Southern WCZ are 23.8°C and 8.0 respectively. According to the "Aqueous Ammonia Equilibrium- Tabulation of Percent Unionized Ammonia" from USEPA, the conversion factor is 5.3%.

[3] TIN concentration is the sum of the concentration of NH_3-N, NO_2-N and NO_3-N (see **Table 4.1**).

[4] CORMIX's recommended value for conservative design condition.

[5] Ambient density is estimated from the EPD water quality monitoring station SM10 from year 2005-2014.

[6] Water depth at Discovery Bay are obtained from nautical chart in Hong Kong, published by the Hydrographic Office, Marine Department of HKSAR Government (**Appendix C**).

5 Evaluation of Impacts

5.1.1.1 **Table 5.1** shows the dilution factors for SS and UIA required to meet the WQOs in marine waters. Since the *E. coli* level of treated effluent has already met the WQO criteria, it is not included in the assessment. The calculation of dilution factor is based on **Equation 5.1**. The WQO criteria can be complied if the predicted dilution factor at the WSRs is higher than the required dilution factor presented in **Table 5.1**.

Table 5.1 Dilution factors for SS and UIA to meet the WQO criteria

	SS (mg/L)	UIA (mg/L)	Remark
Criteria/Target Limit of Conc. ($C_{criteria}$)	8.99	0.021	See Table 4.2
Baseline Conc. ($C_{baseline}$)	6.92	0.004	See Table 2.1
Effluent Discharge Conc. ($C_{effluent}$)	30	0.424	See Table 4.3
Dilution Factor to Meet the Criteria	11	25	Calculation based on Equation 5.1

Note:
As a sample calculation, the required dilution factor for the SS criterion would be (30.00 – 6.92)/(8.99 – 6.92) ≈ 11.

$$DF = \frac{C_{effluent} - C_{baseline}}{C_{criteria} - C_{baseline}} \qquad \textbf{Equation 5.1}$$

where

$C_{effluent}$ is the effluent concentration at the discharge point.
$C_{baseline}$ is the baseline concentration at the WSR.
$C_{criteria}$ is the criteria/ target limit of concentration.

5.1.1.2 **Table 5.2** shows the dilution factor and predicted vertical thickness of sewage plume for the simulated scenario at 320 m of the closest WSR (WSR 05 Hai Tei Wan Marina). For dry season, the simulated scenarios are classified as submerged positively buoyant multiport diffuser discharge in uniform density layer (flow class MU1V, MU1H and MU1 according to CORMIX Manual). For wet season, the simulated scenarios are classified as deeply submerged toxi for plume trapping in a linearly stratified layer (flow class MS1 and MS5 according to CORMIX Manual). The details of CORMIX outputs are presented in **Appendix D**. Based on the modelling result, the lowest predicted dilution factor can be achieved is 306. The predicted vertical thickness of sewage plume is about 0.6 m near the surface.

Table 5.2 Predicted dilution factors and plume vertical thickness at the WSR05 (i.e. 320 m from discharge point)

Season	Ambient flow (m/s)	Dilution Factor	Plume Vertical Thickness (m)
Dry	0.013	480	0.89
	0.042	756	0.98
	0.076	650	0.77
Wet	0.013	306	0.47
	0.042	623	0.57
	0.076	700	0.63

5.1.1.3 Since the predicted dilution factor at the nearest WSR is higher than the required dilution presented in **Table 5.1**, it is anticipated that SS and UIA level would comply with the WQO criteria at all marine based WSRs. The summary of compliance for different water quality parameters is presented in **Table 5.3**.

Table 5.3 Summary of compliance for different water quality paran

Season	Ambient flow (m/s)	SS (mg/L)			*E.coli* (m	
		Predicted Value	Criteria	Compliance	Predicted Value	Criteria
Dry	0.013	6.97	8.99	Yes	8	610
	0.042	6.95	8.99	Yes	8	610
	0.076	6.96	8.99	Yes	8	610
Wet	0.013	7.00	8.99	Yes	8	610
	0.042	6.96	8.99	Yes	8	610
	0.076	6.95	8.99	Yes	8	610

Note:
[1] Baseline TIN level already exceeds the WQO criterion.

neters inside the sewage plume for WSR 05

g/L)	UIA (mg/L)			TIN (mg/L)		
Compliance	Predicted Value	Criteria	Compliance	Predicted Value	Criteria	Compliance
Yes	0.005	0.021	Yes	0.391	0.1	No [1]
Yes	0.005	0.021	Yes	0.376	0.1	No [1]
Yes	0.005	0.021	Yes	0.380	0.1	No [1]
Yes	0.006	0.021	Yes	0.414	0.1	No [1]
Yes	0.005	0.021	Yes	0.382	0.1	No [1]
Yes	0.005	0.021	Yes	0.378	0.1	No [1]

5.1.1.4 Using **Equation 5.1** and the effluent standards in **Section 4.1,** the predicted levels of total inorganic nitrogen (TIN) [redacted] with predicted dilution factors are presented in **Table 5.4.**

Table 5.4 Predicted nitrogen levels at the [redacted]

[redacted]	[redacted]	[redacted]	[redacted]
Dry	0.013	0.391	[redacted]
	0.042	0.376	[redacted]
	0.076	0.380	[redacted]
Wet	0.013	0.414	[redacted]
	0.042	0.382	[redacted]
	0.076	0.378	[redacted]

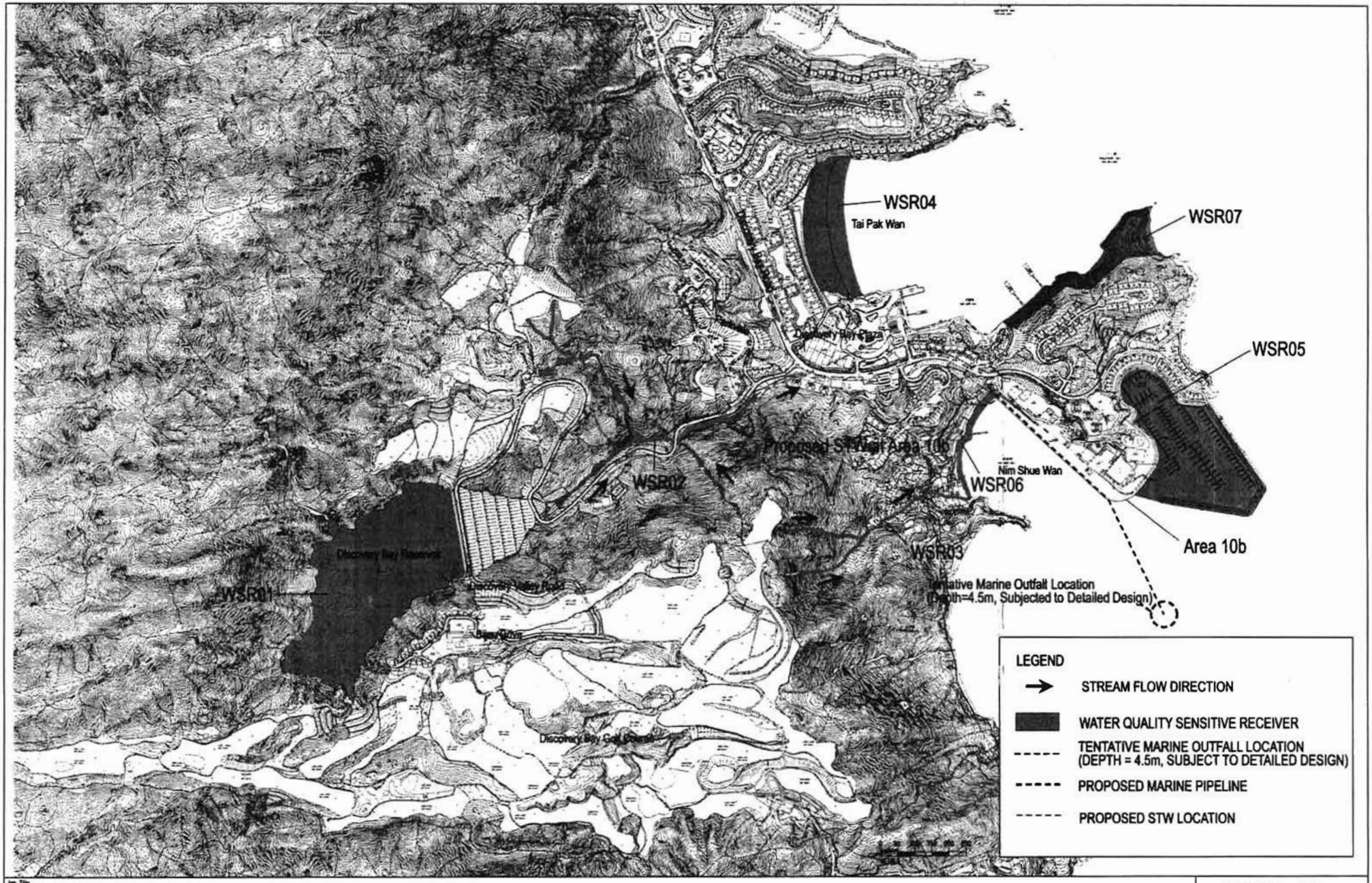
[redacted]

[redacted] The predicted value of TIN [redacted] exceeds the [redacted] baseline value of 0.35 mg/L at the nearest WSR 05 (Hai Tei Wan Marina). [redacted]

6 Conclusion

6.1.1.1 The preliminary water quality impact assessment of the proposed sewage treatment works in Area 10b to the water sensitive receivers during operational phase has be conducted. The modelling result indicates that the water quality in the vicinity of marine-based WSRs would be in compliance with WQOs in SS, *E. coli* and UIA. Exceedance of TIN under WQO is observed. However the contribution is due to high TIN level in background from Pearl River estuary. The predicted depth averaged TIN would slightly increase of the baseline value by 1.2% and is considered as not significant.

Figures



Job Title
DISCOVERY BAY - OPTIMIZATION OF LAND USE

FIGURE 3.1

Date	Scale	Drawing Title
Sept 22	1:10000	Water Quality Sensitive Receivers
Drawn GL	Job No. 235928	

ARUP

Appendix A

EPD Marine Water Quality Monitoring Data

Figure A1 Locations of the Environmental Protection Department's marine monitoring measurement sites, captured from the EPD's marine water reports 2014

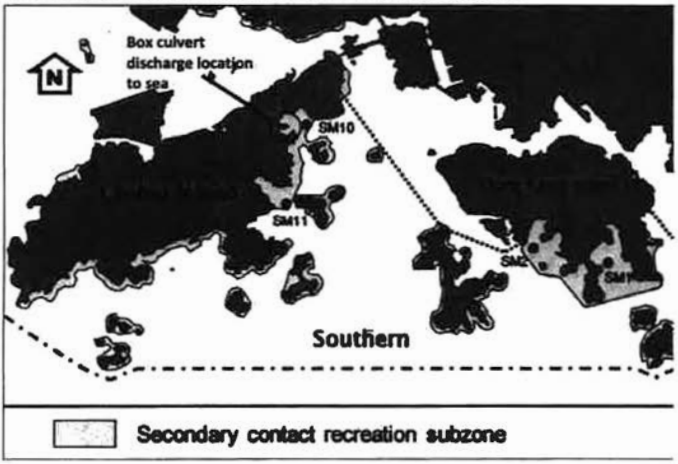


Table A1 Annual average of the water quality parameters at EPD's marine monitoring site SM10

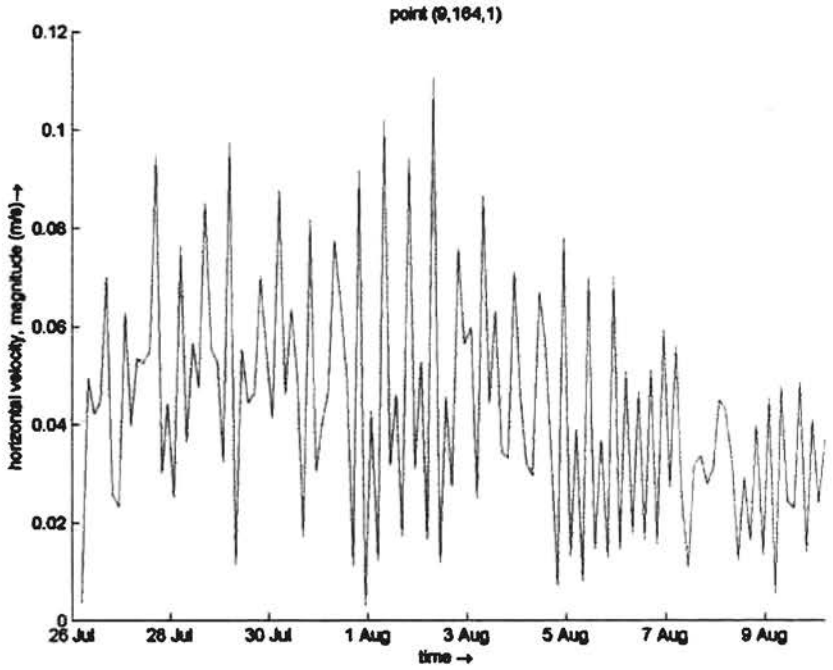
Year	Total Inorganic Nitrogen (mg/L)	E. coli [1] (cfu/100mL)	Suspended Solids (mg/L)	Unionised Ammonia (mg/L)	Total Phosphorus (mg/L)
2005	0.35	9.44	7.10	0.005	0.038
2006	0.32	19.04	9.06	0.006	0.044
2007	0.32	11.28	8.15	0.006	0.046
2008	0.37	14.59	7.33	0.005	0.041
2009	0.28	10.51	8.28	0.003	0.037
2010	0.33	5.00	5.46	0.003	0.035
2011	0.36	2.37	7.12	0.003	0.039
2012	0.42	2.82	7.20	0.003	0.038
2013	0.35	2.78	3.92	0.003	0.039
2014	0.30	4.30	4.68	0.004	0.045

Note:
[1] According to WQO, the criterion for *E. coli* should be calculated as annual geometric mean of its concentration, instead of the annual arithmetic mean.

Appendix B

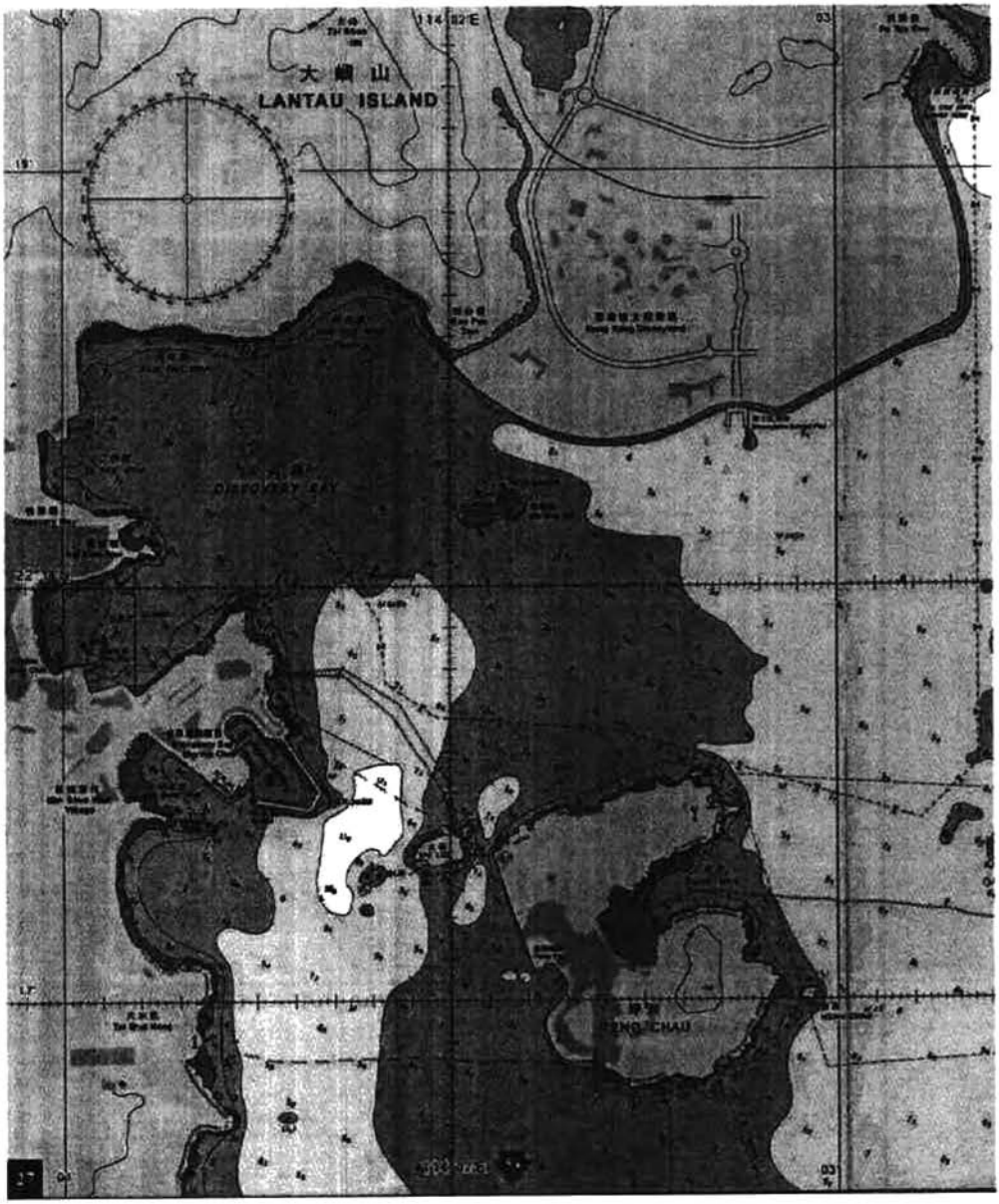
Delft 3D Modelling Result

Extracted ambient velocity from Grid
(M: 9, N: 164)



Appendix C

Bathymetry of Discovery Bay


大嶼山
LANTAU ISLAND
114 02'E
DISCOVERY BAY

圖例

地貌 TOPOGRAPHY

自然地貌 Natural Features


海岸線(乾潮位)
Coastline, surveyed


陡岸
Steep coast


沙質岸
Sandy shore


石質岸
Stony shore


等高線(計曲線)及高程點
Contour lines with values and spot height


河流・溪流
River, Stream


水庫・塘
Reservoir, Pond


鹽田
Salt pans


紅樹林
Mangrove


沼澤
Marsh

人工地貌 Cultural Features


市區
Urban area


道路
Road


機場
Airport, Airfield


最高天文潮基準面垂直淨空
Vertical clearance above the Highest Astronomical Tide


架空索道・架空垂降索
Overhead transporter, Aerial cableway with vertical clearance

陸地標記 Landmarks


廟宇
Temple


塔
Tower


煙囪・紀念碑
Chimney, Monument


風力發電機・旗杆
Wind turbine, Flagstaff


無線電桅・無線電塔
Radio mast, Radio tower


碟形天線
Dish aerial

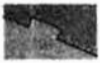

貯油桶
Tanks

港口 Ports


海堤
Seawall


防波堤
Breakwater


突堤(設有泊船設施)
Mole
(with berthing facilities)


碼頭・躉船
Quay, Wharf


突堤式碼頭
Pier, Jetty


浮碼頭・登岸梯級
Pontoon, Landing steps


泊位編號
Designation of berth


繫船柱
Dolphin


船台滑道
Slipway


浮塢
Floating dock

航行設備 NAVIGATION AIDS

燈標・立標 Lights, Beacons

主燈標
Major light


導標
Leading lights


定向燈
Direction light

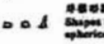

扇形燈
Sector light

燈標標記
Lighted marks


一般立標
Beacon in general


電纜浮標登陸立標
Cable landing beacon

浮標 Buoys


浮標形狀(錐形・球形・柱形・杆形)
Shapes of buoys (conical, can, spherical, pillar)

管狀浮標
Mooring buoy

方位浮標(北・東・南・西)
Cardinal buoys (North, East, South, West)

孤立危險物浮標
Isolated danger buoy

安全水域浮標
Safe water buoys

特殊浮標
Special buoys

霧號、雷達 Fog Signal, Radar

燈立標上的霧号
(舉例:一次・周期15秒)
Lighted beacon, with horn giving a single blast every 15 seconds

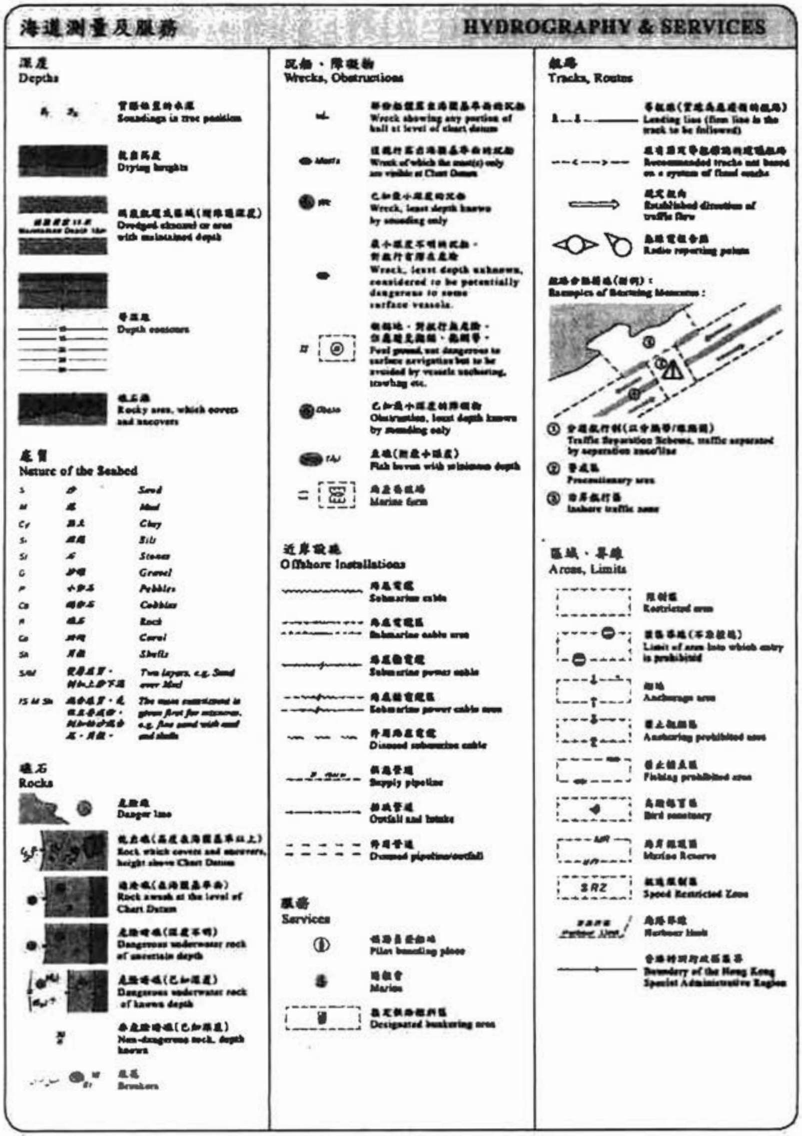
雷達應答器
Radar transponder beacon

自動識別系統發射機
Automatic Identification System transmitter

一般信號站
Signal station in general

航道走向
Direction of buoyage

LEGEND


海道測量及服務
HYDROGRAPHY & SERVICES
Depths
Soundings in true position
Drying heights
Dredged channel or area with maintained depth
Depth contours
Rocky area, which covers and uncovers
Nature of the Seabed
Sand
Mud
Clay
Silt
Stones
Gravel
Pebbles
Cobbles
Rock
Coral
Shells
Two layers, e.g. Sand over Mud
Rocks
Danger line
Rock which covers and uncovers, height above Chart Datum
Rock awash at the level of Chart Datum
Dangerous underwater rock of uncertain depth
Dangerous underwater rock of known depth
Non-dangerous rock, depth known
Breakers
Wrecks, Obstructions
Wreck showing any portion of hull at level of chart datum
Wreck of which the mast(s) only are visible at Chart Datum
Wreck, least depth known by sounding only
Wreck, least depth unknown, considered to be potentially dangerous to some surface vessels.
Foul ground, not dangerous to surface navigation but to be avoided by vessels anchoring, trawling etc.
Obstruction, least depth known by sounding only
Fish haven with minimum depth
Marine farm
Offshore Installations
Submarine cable
Submarine cable area
Submarine power cable
Submarine power cable area
Disused submarine cable
Supply pipeline
Outfall and Intake
Disused pipeline/outfall
Services
Pilot boarding place
Marina
Designated bunkering area
Tracks, Routes
Leading line (firm line is the track to be followed)
Recommended tracks not based on a system of fixed marks
Established direction of traffic flow
Radio reporting points
Examples of Routeing Measures:
Traffic Separation Scheme, traffic separated by separation zone/line
Precautionary area
Inshore traffic zone
Areas, Limits
Restricted area
Limit of area into which entry is prohibited
Anchorage area
Anchoring prohibited area
Fishing prohibited area
Bird sanctuary
Marine Reserve
SRZ
Speed Restricted Zone
Harbour limit
Boundary of the Hong Kong Special Administrative Region

Appendix D

CORMIX model output

```
CORMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222222222
                    CORMIX MIXING ZONE EXPERT SYSTEM
          Subsystem CORMIX2:  Multiport Diffuser Discharges
                       CORMIX Version 5.0GT
                    HYDRO2 Version 5.0.1.0 December 2007
------------------------------------------------------------------------------
------------------------------------------------------------------------------
CASE DESCRIPTION
 Site name/label:
 Design case:
 FILE NAME:          C:\...5928\cormix\Area10b\8port_lower_flow\dry_u010.prd
 Time stamp:         Thu Oct 20 10:30:15 2016

ENVIRONMENT PARAMETERS (metric units)
 Unbounded section
 HA    =      4.50  HD    =      4.50
 UA    =     0.013  F     =     0.019 USTAR =0.6338E-03
 UW    =     2.000  UWSTAR=0.2198E-02
 Uniform density environment
 STRCND=  U         RHOAM = 1022.0000

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:     DITYPE= alternating_perpendicular
 BANK  =  LEFT      DISTB =    305.00  YB1   =    300.00  YB2   =    310.00
 LD    =    10.00   NOPEN =         8  SPAC  =      1.43
 D0    =    0.045   A0    =     0.002 H0    =      0.00  SUB0  =      4.50
 Nozzle/port arrangement:   alternating_without_fanning
 GAMMA =    90.00   THETA =      0.00  SIGMA =      0.00  BETA  =     90.00
 U0    =    0.998   Q0    =     0.013       =0.1270E-01
 RHO0  = 1000.0000  DRHO0 =0.2200E+02  GP0   =0.2111E+00
 C0    =0.1000E+01  CUNITS=  mg/l
 IPOLL =  1         KS    =0.0000E+00  KD    =0.0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0    =0.1270E-02  m0    =0.1268E-02  j0    =0.2681E-03  SIGNJ0=      1.0
 Associated 2-d length scales (meters)
 lQ=B  =     0.001  lM    =      0.31  lm    =      7.50
 lmp   =  99999.00  lbp   =  99999.00  la    =  99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0    =0.1270E-01  M0    =0.1268E-01  J0    =0.2681E-02
 Associated 3-d length scales (meters)
 LQ    =     0.04   LM    =      0.73  Lm    =      8.66  Lb    =   1220.30
                                       Lmp   =  99999.00  Lbp   =  99999.00

NON-DIMENSIONAL PARAMETERS
 FR0   =     60.90  FRD0  =     10.24  R     =     76.78  PL    =     73.
 (slot)             (port/nozzle)

RECOMPUTED SOURCE CONDITIONS FOR ALTERNATING JETS OR RISER GROUPS:
 Momentum fluxes:   m0    =0.8909E-04  M0    =0.8909E-03
 lQ=B  =     0.018  lM    =      0.02  lm    =      0.53  lmp   =  99999.00
 LQ    =     0.030  LM    =      0.10  Lm    =      2.30  Lmp   =  99999.00
 Properties of riser group with  1 ports/nozzles each:
 U0    =     0.070  D0    =     0.170  A0    =     0.023  THETA =     90.00
 FR0   =      1.13  FRD0  =      0.37  R     =      5.40
 (slot)             (riser group)

FLOW CLASSIFICATION
 22222222222222222222222222222222222222222
 2  Flow class (CORMIX2)      =    MU1V   2
 2  Applicable layer depth HS =     4.50  2
 22222222222222222222222222222222222222222

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.1000E+01  CUNITS=  mg/l
 NTOX  =  0
```

```
 NSTD  =  1          CSTD  =0.4700E-02
 REGMZ =  0
 XINT  =   2000.00  XMAX  =   2000.00

X-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the bottom and the diffuser mid-point:
       305.00 m  from the LEFT  bank/shore.
    X-axis points downstream, Y-axis points to left, Z-axis points upward.
NSTEP =  50 display intervals per module
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
BEGIN MOD101: DISCHARGE MODULE (SINGLE PORT AT DIFFUSER CENTER)

       X        Y        Z        S        C        BV       BH
    0.00     0.00     0.00      1.0 0.100E+01   0.08     0.08

END OF MOD101: DISCHARGE MODULE (SINGLE PORT AT DIFFUSER CENTER)
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
BEGIN CORJET (MOD110): JET/PLUME NEAR-FIELD MIXING REGION

 Jet/plume transition motion in weak crossflow.

 Zone of flow establishment:              THETAE=     85.61  SIGMAE=      0.00
  LE    =      0.13  XE    =      0.01  YE    =      0.00  ZE    =      0.13

 Profile definitions:
   BV = Gaussian 1/e (37%) half-width, in vertical plane normal to trajectory
   BH = before merging: Gaussian 1/e (37%) half-width in horizontal plane
                        normal to trajectory
        after merging:  top-hat half-width in horizontal plane
                        parallel to diffuser line
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)

       X        Y        Z        S        C        BV       BH
 Individual jet/plumes before merging:
     0.01     0.00     0.13      1.0 0.100E+01   0.08     0.08
     0.01     0.00     0.13      1.0 0.100E+01   0.08     0.08
     0.08     0.00     0.33      1.7 0.596E+00   0.07     0.07
     0.20     0.00     0.51      3.1 0.325E+00   0.09     0.09
     0.33     0.00     0.68      4.8 0.209E+00   0.12     0.12
     0.47     0.00     0.84      6.7 0.149E+00   0.15     0.15
     0.62     0.00     0.99      8.8 0.113E+00   0.18     0.18
     0.79     0.00     1.12     11.0 0.906E-01   0.20     0.20
     0.97     0.00     1.24     13.3 0.752E-01   0.23     0.23
     1.16     0.00     1.34     15.5 0.643E-01   0.25     0.25
     1.36     0.00     1.43     17.8 0.561E-01   0.27     0.27
     1.55     0.00     1.51     20.1 0.498E-01   0.29     0.29
     1.76     0.00     1.59     22.3 0.448E-01   0.32     0.32
     1.96     0.00     1.65     24.6 0.407E-01   0.34     0.34
     2.17     0.00     1.71     26.9 0.372E-01   0.36     0.36
     2.37     0.00     1.76     29.1 0.344E-01   0.38     0.38
     2.58     0.00     1.81     31.4 0.319E-01   0.40     0.40
     2.79     0.00     1.86     33.6 0.298E-01   0.42     0.42
     3.00     0.00     1.90     35.9 0.279E-01   0.43     0.43
     3.21     0.00     1.94     38.2 0.262E-01   0.45     0.45
     3.42     0.00     1.98     40.5 0.247E-01   0.47     0.47
     3.63     0.00     2.02     42.8 0.233E-01   0.49     0.49
     3.84     0.00     2.06     45.2 0.221E-01   0.51     0.51
     4.06     0.00     2.10     47.7 0.210E-01   0.52     0.52
     4.27     0.00     2.14     50.2 0.199E-01   0.54     0.54
     4.48     0.00     2.18     52.7 0.190E-01   0.56     0.56
     4.69     0.00     2.22     55.2 0.181E-01   0.58     0.58
     4.90     0.00     2.26     57.8 0.173E-01   0.59     0.59
     5.11     0.00     2.30     60.4 0.165E-01   0.61     0.61
     5.32     0.00     2.34     63.1 0.158E-01   0.63     0.63
     5.53     0.00     2.38     65.8 0.152E-01   0.65     0.65
```

5.74	0.00	2.42	68.6	0.146E-01	0.66	0.66
5.95	0.00	2.46	71.3	0.140E-01	0.68	0.68
6.16	0.00	2.50	74.2	0.135E-01	0.70	0.70
6.38	0.00	2.53	77.0	0.130E-01	0.71	0.71

Merging of individual jet/plumes to form plane jet/plume:

6.40	0.00	2.54	100.9	0.991E-02	0.90	5.90
6.80	0.00	2.60	104.7	0.955E-02	0.93	5.93
7.01	0.00	2.64	106.7	0.938E-02	0.94	5.94
7.22	0.00	2.67	108.6	0.921E-02	0.96	5.96
7.43	0.00	2.70	110.6	0.904E-02	0.98	5.98
7.65	0.00	2.73	112.6	0.888E-02	0.99	5.99
7.86	0.00	2.77	114.5	0.873E-02	1.01	6.01
8.07	0.00	2.80	116.5	0.858E-02	1.03	6.03
8.28	0.00	2.83	118.5	0.844E-02	1.04	6.04
8.49	0.00	2.87	120.4	0.830E-02	1.06	6.06
8.71	0.00	2.90	122.4	0.817E-02	1.08	6.08
8.92	0.00	2.93	124.4	0.804E-02	1.09	6.09
9.13	0.00	2.97	126.4	0.791E-02	1.11	6.11
9.34	0.00	3.00	128.4	0.779E-02	1.13	6.13
9.55	0.00	3.04	130.4	0.767E-02	1.14	6.14
9.76	0.00	3.07	132.4	0.755E-02	1.16	6.16
9.98	0.00	3.10	134.4	0.744E-02	1.18	6.18

Cumulative travel time = 90.1355 sec

END OF CORJET (MOD110): JET/PLUME NEAR-FIELD MIXING REGION

BEGIN MOD232: LAYER BOUNDARY IMPINGEMENT/UPSTREAM SPREADING

Vertical angle of layer/boundary impingement = 9.11 deg
Horizontal angle of layer/boundary impingement = 0.00 deg

UPSTREAM INTRUSION PROPERTIES:

Upstream intrusion length	=	319.35 m
X-position of upstream stagnation point	=	-309.37 m
Thickness in intrusion region	=	0.02 m
Half-width at downstream end	=	447.20 m
Thickness at downstream end	=	0.47 m

In this case, the upstream INTRUSION IS VERY LARGE, exceeding 10 times the local water depth.
This may be caused by a very small ambient velocity, perhaps in combination with large discharge buoyancy.
If the ambient conditions are strongly transient (e.g. tidal), then the CORMIX steady-state predictions of upstream intrusion are probably unrealistic.
The plume predictions prior to boundary impingement and wedge formation will be acceptable, however.

Control volume inflow:

X	Y	Z	S	C	BV	BH
9.98	0.00	3.10	134.4	0.744E-02	1.18	6.18

Profile definitions:
BV = top-hat thickness, measured vertically
BH = top-hat half-width, measured horizontally in y-direction
ZU = upper plume boundary (Z-coordinate)
ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic average (bulk) dilution
C = average (bulk) concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH	ZU	ZL
-309.37	0.00	4.50	9999.9	0.000E+00	0.00	0.00	4.50	4.50

** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **
The pollutant concentration in the plume falls below water quality standard or CCC value of 0.470E-02 in the current prediction interval.
This is the spatial extent of concentrations exceeding the water quality standard or CCC value.

-298.51	0.00	4.50	581.5	0.172E-02	0.01	63.24	4.50	4.49
-245.30	0.00	4.50	241.3	0.414E-02	0.01	153.62	4.50	4.49
-192.09	0.00	4.50	181.9	0.550E-02	0.02	207.84	4.50	4.48
-138.89	0.00	4.50	155.8	0.642E-02	0.02	250.59	4.50	4.48
-85.68	0.00	4.50	142.3	0.703E-02	0.02	287.04	4.50	4.48
-32.47	0.00	4.50	135.8	0.736E-02	0.02	319.36	4.50	4.48
20.74	0.00	4.50	137.1	0.729E-02	0.03	424.24	4.50	4.47
73.95	0.00	4.50	217.5	0.460E-02	0.15	430.55	4.50	4.35
127.16	0.00	4.50	332.9	0.300E-02	0.32	436.43	4.50	4.18
180.37	0.00	4.50	402.9	0.248E-02	0.43	441.96	4.50	4.07
233.58	0.00	4.50	432.1	0.231E-02	0.47	447.20	4.50	4.03

Cumulative travel time = 17290.1152 sec

END OF MOD232: LAYER BOUNDARY IMPINGEMENT/UPSTREAM SPREADING

** End of NEAR-FIELD REGION (NFR) **

In this design case, the diffuser is located CLOSE TO BANK/SHORE.
Some boundary interaction occurs at end of near-field.
This may be related to a design case with a VERY LOW AMBIENT VELOCITY.
The dilution values in one or more of the preceding zones may be too high.
Carefully evaluate results in near-field and check degree of interaction.

Consider locating outfall further away from bank or shore.
In the next prediction module, the plume centerline will be set
to follow the bank/shore.

BEGIN MOD241: BUOYANT AMBIENT SPREADING

Plume is ATTACHED to LEFT bank/shore.
Plume width is now determined from LEFT bank/shore.

Profile definitions:
BV = top-hat thickness, measured vertically
BH = top-hat half-width, measured horizontally in y-direction
ZU = upper plume boundary (z-coordinate)
ZL = lower plume boundary (z-coordinate)
S = hydrodynamic average (bulk) dilution
C = average (bulk) concentration (includes reaction effects, if any)

Plume Stage 2 (bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
233.58	305.00	4.50	432.1	0.231E-02	0.56	752.20	4.50	3.94
268.90	305.00	4.50	455.5	0.220E-02	0.57	775.13	4.50	3.93
304.23	305.00	4.50	480.0	0.208E-02	0.59	797.69	4.50	3.91
339.56	305.00	4.50	505.8	0.198E-02	0.60	819.91	4.50	3.90
374.89	305.00	4.50	532.9	0.188E-02	0.62	841.84	4.50	3.88
410.22	305.00	4.50	561.3	0.178E-02	0.64	863.48	4.50	3.86
445.55	305.00	4.50	590.9	0.169E-02	0.65	884.86	4.50	3.85
480.87	305.00	4.50	621.9	0.161E-02	0.67	906.00	4.50	3.83
516.20	305.00	4.50	654.3	0.153E-02	0.69	926.92	4.50	3.81
551.53	305.00	4.50	688.0	0.145E-02	0.71	947.64	4.50	3.79
586.86	305.00	4.50	723.2	0.138E-02	0.73	968.16	4.50	3.77
622.19	305.00	4.50	759.7	0.132E-02	0.75	988.50	4.50	3.75
657.52	305.00	4.50	797.7	0.125E-02	0.77	1008.67	4.50	3.73
692.85	305.00	4.50	837.2	0.119E-02	0.80	1028.69	4.50	3.70
728.17	305.00	4.50	878.1	0.114E-02	0.82	1048.55	4.50	3.68
763.50	305.00	4.50	920.5	0.109E-02	0.84	1068.27	4.50	3.66
798.83	305.00	4.50	964.4	0.104E-02	0.87	1087.85	4.50	3.63
834.16	305.00	4.50	1009.9	0.990E-03	0.89	1107.31	4.50	3.61
869.49	305.00	4.50	1057.0	0.946E-03	0.92	1126.64	4.50	3.58
904.82	305.00	4.50	1105.6	0.905E-03	0.94	1145.86	4.50	3.56
940.15	305.00	4.50	1155.8	0.865E-03	0.97	1164.96	4.50	3.53
975.47	305.00	4.50	1207.6	0.828E-03	1.00	1183.96	4.50	3.50
1010.80	305.00	4.50	1261.1	0.793E-03	1.02	1202.85	4.50	3.48
1046.13	305.00	4.50	1316.2	0.760E-03	1.05	1221.65	4.50	3.45
1081.46	305.00	4.50	1372.9	0.728E-03	1.08	1240.35	4.50	3.42
1116.79	305.00	4.50	1431.4	0.699E-03	1.11	1258.95	4.50	3.39

1152.12	305.00	4.50	1491.6	0.670E-03	1.14	1277.47	4.50	3.36
1187.44	305.00	4.50	1553.4	0.644E-03	1.17	1295.90	4.50	3.33
1222.77	305.00	4.50	1617.1	0.618E-03	1.20	1314.25	4.50	3.30
1258.10	305.00	4.50	1682.4	0.594E-03	1.23	1332.52	4.50	3.27
1293.43	305.00	4.50	1749.6	0.572E-03	1.27	1350.71	4.50	3.23
1328.76	305.00	4.50	1818.5	0.550E-03	1.30	1368.82	4.50	3.20
1364.09	305.00	4.50	1889.3	0.529E-03	1.33	1386.85	4.50	3.17
1399.42	305.00	4.50	1961.9	0.510E-03	1.36	1404.82	4.50	3.14
1434.74	305.00	4.50	2036.3	0.491E-03	1.40	1422.71	4.50	3.10
1470.07	305.00	4.50	2112.6	0.473E-03	1.43	1440.54	4.50	3.07
1505.40	305.00	4.50	2190.7	0.456E-03	1.47	1458.29	4.50	3.03
1540.73	305.00	4.50	2270.8	0.440E-03	1.50	1475.98	4.50	3.00
1576.06	305.00	4.50	2352.8	0.425E-03	1.54	1493.61	4.50	2.96
1611.39	305.00	4.50	2436.6	0.410E-03	1.58	1511.17	4.50	2.92
1646.71	305.00	4.50	2522.5	0.396E-03	1.61	1528.67	4.50	2.89
1682.04	305.00	4.50	2610.2	0.383E-03	1.65	1546.11	4.50	2.85
1717.37	305.00	4.50	2700.0	0.370E-03	1.69	1563.49	4.50	2.81
1752.70	305.00	4.50	2791.7	0.358E-03	1.73	1580.82	4.50	2.77
1788.03	305.00	4.50	2885.4	0.347E-03	1.76	1598.08	4.50	2.74
1823.36	305.00	4.50	2981.2	0.335E-03	1.80	1615.29	4.50	2.70
1858.69	305.00	4.50	3079.0	0.325E-03	1.84	1632.44	4.50	2.66
1894.01	305.00	4.50	3178.8	0.315E-03	1.88	1649.54	4.50	2.62
1929.34	305.00	4.50	3280.7	0.305E-03	1.92	1666.58	4.50	2.58
1964.67	305.00	4.50	3384.7	0.295E-03	1.96	1683.58	4.50	2.54
2000.00	305.00	4.50	3490.8	0.286E-03	2.01	1700.52	4.50	2.49

Cumulative travel time = 153168.9375 sec

Simulation limit based on maximum specified distance = 2000.00 m.
This is the REGION OF INTEREST limitation.

END OF MOD241: BUOYANT AMBIENT SPREADING

CORMIX2: Multiport Diffuser Discharges End of Prediction File
2222222222222222222222222222222222222222222222222222222222222222222222222222222222

```
CORMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222222222
                    CORMIX MIXING ZONE EXPERT SYSTEM
          Subsystem CORMIX2:  Multiport Diffuser Discharges
                        CORMIX Version 5.0GT
                    HYDRO2 Version 5.0.1.0 December 2007
------------------------------------------------------------------------------
------------------------------------------------------------------------------

CASE DESCRIPTION
 Site name/label:
 Design case:
 FILE NAME:          C:\...5928\cormix\Area10b\8port_lower_flow\dry_u050.prd
 Time stamp:         Thu Oct 20 10:31:02 2016

ENVIRONMENT PARAMETERS (metric units)
 Unbounded section
 HA    =      4.50  HD    =      4.50
 UA    =     0.042  F     =     0.019 USTAR =0.2048E-02
 UW    =     2.000 UWSTAR=0.2198E-02
 Uniform density environment
 STRCND=  U          RHOAM = 1022.0000

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:      DITYPE= alternating_perpendicular
 BANK  =  LEFT       DIST8 =    305.00  YB1   =    300.00  YB2   =    310.00
 LD    =    10.00  NOPEN =     8       SPAC  =      1.43
 D0    =    0.045  A0    =     0.002 H0    =      0.00  SUB0  =      4.50
 Nozzle/port arrangement:   alternating_without_fanning
 GAMMA =     90.00  THETA =      0.00  SIGMA =      0.00  BETA  =     90.00
 U0    =     0.998  Q0    =     0.013       =0.1270E-01
 RHO0  = 1000.0000  DRHO0 =0.2200E+02  GP0   =0.2111E+00
 C0    =0.1000E+01  CUNITS=  mg/l
 IPOLL =  1         KS    =0.0000E+00  KD    =0.0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0    =0.1270E-02  m0    =0.1268E-02  j0    =0.2681E-03  SIGNJ0=      1.0
 Associated 2-d length scales (meters)
 lQ=B  =     0.001 lM    =      0.31  lm    =      0.72
 lmp   =  99999.00  lbp   =  99999.00  la    =  99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0    =0.1270E-01  M0    =0.1268E-01  J0    =0.2681E-02
 Associated 3-d length scales (meters)
 LQ    =     0.04  LM    =      0.73  Lm    =      2.68  Lb    =     36.19
                                      Lmp   =  99999.00  Lbp   =  99999.00

NON-DIMENSIONAL PARAMETERS
 FR0   =     60.90  FRD0  =     10.24  R     =     23.77  PL    =     73.
 (slot)             (port/nozzle)

RECOMPUTED SOURCE CONDITIONS FOR ALTERNATING JETS OR RISER GROUPS:
 Momentum fluxes:    m0    =0.8909E-04  M0    =0.8909E-03
 lQ=B  =     0.018 lM    =      0.02  lm    =      0.05  lmp   =  99999.00
 LQ    =     0.030 LM    =      0.10  Lm    =      0.71  Lmp   =  99999.00
 Properties of riser group with  1 ports/nozzles each:
 U0    =     0.070 D0    =     0.170 A0    =     0.023 THETA =     90.00
 FR0   =      1.13  FRD0  =      0.37  R     =      1.67
 (slot)             (riser group)

FLOW CLASSIFICATION
 22222222222222222222222222222222222222222222
 2  Flow class (CORMIX2)       =    MU1H   2
 2  Applicable layer depth HS =      4.50  2
 22222222222222222222222222222222222222222222

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.1000E+01  CUNITS=  mg/l
 NTOX  =  0
```

```
NSTD   =  1          CSTD  =0.4700E-02
REGMZ  =  0
XINT   =   2000.00   XMAX  =   2000.00

X-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the bottom and the diffuser mid-point:
      305.00 m  from the LEFT  bank/shore.
    X-axis points downstream, Y-axis points to left, Z-axis points upward.
NSTEP =  50 display intervals per module
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
BEGIN MOD101: DISCHARGE MODULE (SINGLE PORT AT DIFFUSER CENTER)

       X        Y        Z        S        C        BV       BH
    0.00     0.00     0.00     1.0 0.100E+01   0.08     0.08

END OF MOD101: DISCHARGE MODULE (SINGLE PORT AT DIFFUSER CENTER)
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
BEGIN CORJET (MOD110): JET/PLUME NEAR-FIELD MIXING REGION

 Jet/plume transition motion in strong crossflow.

 Zone of flow establishment:              THETAE=     76.07  SIGMAE=      0.00
  LE    =      0.00  XE    =      0.00  YE    =      0.00  ZE    =      0.00

 Profile definitions:
   BV = Gaussian 1/e (37%) half-width, in vertical plane normal to trajectory
   BH = before merging: Gaussian 1/e (37%) half-width in horizontal plane
                        normal to trajectory
        after merging:  top-hat half-width in horizontal plane
                        parallel to diffuser line
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)

       X        Y        Z        S        C        BV       BH
 Individual jet/plumes before merging:
    0.00     0.00     0.00     1.0 0.100E+01   0.08     0.08
    0.66     0.00     0.24     3.6 0.279E+00   0.11     0.11
    1.33     0.00     0.43     7.6 0.132E+00   0.16     0.16
    2.03     0.00     0.55    12.1 0.825E-01   0.22     0.22
    2.72     0.00     0.65    17.0 0.590E-01   0.27     0.27
    3.42     0.00     0.73    22.0 0.455E-01   0.31     0.31
    4.12     0.00     0.79    27.1 0.369E-01   0.35     0.35
    4.82     0.00     0.84    32.3 0.310E-01   0.39     0.39
    5.52     0.00     0.88    37.5 0.266E-01   0.43     0.43
    6.23     0.00     0.92    43.0 0.233E-01   0.47     0.47
    6.93     0.00     0.96    48.6 0.206E-01   0.50     0.50
    7.63     0.00     1.00    54.3 0.184E-01   0.54     0.54
    8.33     0.00     1.04    60.2 0.166E-01   0.57     0.57
    9.03     0.00     1.08    66.3 0.151E-01   0.61     0.61
    9.74     0.00     1.11    72.5 0.138E-01   0.64     0.64
   10.44     0.00     1.15    78.8 0.127E-01   0.67     0.67
   11.14     0.00     1.19    85.3 0.117E-01   0.70     0.70
 Merging of individual jet/plumes to form plane jet/plume:
   11.49     0.00     1.20   109.5 0.913E-02   0.90     5.90
   12.54     0.00     1.25   116.0 0.862E-02   0.95     5.95
   13.24     0.00     1.29   120.3 0.831E-02   0.98     5.98
   13.95     0.00     1.32   124.6 0.803E-02   1.02     6.02
   14.65     0.00     1.35   128.9 0.776E-02   1.05     6.05
   15.35     0.00     1.38   133.2 0.751E-02   1.09     6.09
   16.05     0.00     1.42   137.5 0.727E-02   1.13     6.13
   16.75     0.00     1.45   141.9 0.705E-02   1.16     6.16
   17.46     0.00     1.48   146.2 0.684E-02   1.20     6.20
   18.16     0.00     1.52   150.6 0.664E-02   1.23     6.23
   18.86     0.00     1.55   154.9 0.645E-02   1.27     6.27
   19.56     0.00     1.59   159.3 0.628E-02   1.30     6.30
   20.27     0.00     1.62   163.7 0.611E-02   1.34     6.34
```

20.97	0.00	1.66	168.1	0.595E-02	1.37	6.37
21.67	0.00	1.69	172.5	0.580E-02	1.41	6.41
22.37	0.00	1.73	176.9	0.565E-02	1.45	6.45
23.08	0.00	1.76	181.3	0.552E-02	1.48	6.48
23.78	0.00	1.80	185.7	0.538E-02	1.52	6.52
24.48	0.00	1.83	190.2	0.526E-02	1.55	6.55
25.18	0.00	1.87	194.6	0.514E-02	1.59	6.59
25.89	0.00	1.90	199.1	0.502E-02	1.63	6.63
26.59	0.00	1.94	203.6	0.491E-02	1.66	6.66
27.29	0.00	1.98	208.1	0.481E-02	1.70	6.70
27.99	0.00	2.01	212.6	0.470E-02	1.73	6.73

** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **
The pollutant concentration in the plume falls below water quality standard or CCC value of 0.470E-02 in the current prediction interval.
This is the spatial extent of concentrations exceeding the water quality standard or CCC value.

28.70	0.00	2.05	217.1	0.461E-02	1.77	6.77
29.40	0.00	2.09	221.6	0.451E-02	1.81	6.81
30.10	0.00	2.12	226.1	0.442E-02	1.84	6.84
30.80	0.00	2.16	230.6	0.434E-02	1.88	6.88
31.51	0.00	2.20	235.2	0.425E-02	1.92	6.92
32.21	0.00	2.23	239.8	0.417E-02	1.95	6.95
32.91	0.00	2.27	244.3	0.409E-02	1.99	6.99
33.61	0.00	2.31	248.9	0.402E-02	2.03	7.03
34.31	0.00	2.35	253.5	0.394E-02	2.06	7.06
35.02	0.00	2.39	258.1	0.387E-02	2.10	7.10

Cumulative travel time = 414.8818 sec

END OF CORJET (MOD110): JET/PLUME NEAR-FIELD MIXING REGION

BEGIN MOD235: LAYER/BOUNDARY/TERMINAL LAYER APPROACH

Control volume inflow:

X	Y	Z	S	C	BV	BH
35.02	0.00	2.39	258.1	0.387E-02	2.10	7.10

Profile definitions:
BV = top-hat thickness, measured vertically
BH = top-hat half-width, measured horizontally in y-direction
ZU = upper plume boundary (Z-coordinate)
ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic average (bulk) dilution
C = average (bulk) concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH	ZU	ZL
32.92	0.00	4.50	258.1	0.387E-02	0.00	0.00	4.50	4.50
34.18	0.00	4.50	258.1	0.387E-02	3.36	6.32	4.50	1.14
35.44	0.00	4.50	264.5	0.378E-02	3.94	14.09	4.50	0.56
36.70	0.00	4.50	334.9	0.299E-02	4.27	14.11	4.50	0.23
37.96	0.00	4.50	397.7	0.251E-02	4.44	14.12	4.50	0.06
39.22	0.00	4.50	420.6	0.238E-02	4.50	14.13	4.50	0.00

Cumulative travel time = 514.8773 sec

END OF MOD235: LAYER/BOUNDARY/TERMINAL LAYER APPROACH

** End of NEAR-FIELD REGION (NFR) **

BEGIN MOD241: BUOYANT AMBIENT SPREADING

Profile definitions:
BV = top-hat thickness, measured vertically
BH = top-hat half-width, measured horizontally in y-direction
ZU = upper plume boundary (Z-coordinate)
ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic average (bulk) dilution
C = average (bulk) concentration (includes reaction effects, if any)

Plume Stage 1 (not bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
39.22	0.00	4.50	420.6	0.238E-02	4.50	14.13	4.50	0.00
64.10	0.00	4.50	508.6	0.197E-02	2.55	30.10	4.50	1.95
88.99	0.00	4.50	555.2	0.180E-02	1.98	42.47	4.50	2.52
113.88	0.00	4.50	588.9	0.170E-02	1.67	53.21	4.50	2.83
138.77	0.00	4.50	616.2	0.162E-02	1.48	62.91	4.50	3.02
163.65	0.00	4.50	639.8	0.156E-02	1.35	71.89	4.50	3.15
188.54	0.00	4.50	661.2	0.151E-02	1.24	80.31	4.50	3.26
213.43	0.00	4.50	681.2	0.147E-02	1.17	88.28	4.50	3.33
238.32	0.00	4.50	700.4	0.143E-02	1.10	95.88	4.50	3.40
263.20	0.00	4.50	719.0	0.139E-02	1.05	103.16	4.50	3.45
288.09	0.00	4.50	737.4	0.136E-02	1.01	110.17	4.50	3.49
312.98	0.00	4.50	755.9	0.132E-02	0.98	116.94	4.50	3.52
337.87	0.00	4.50	774.4	0.129E-02	0.95	123.50	4.50	3.55
362.75	0.00	4.50	793.3	0.126E-02	0.92	129.87	4.50	3.58
387.64	0.00	4.50	812.5	0.123E-02	0.90	136.07	4.50	3.60
412.53	0.00	4.50	832.3	0.120E-02	0.89	142.11	4.50	3.61
437.42	0.00	4.50	852.5	0.117E-02	0.87	148.01	4.50	3.63
462.31	0.00	4.50	873.5	0.114E-02	0.86	153.78	4.50	3.64
487.19	0.00	4.50	895.0	0.112E-02	0.85	159.42	4.50	3.65
512.08	0.00	4.50	917.4	0.109E-02	0.84	164.96	4.50	3.66
536.97	0.00	4.50	940.4	0.106E-02	0.83	170.39	4.50	3.67
561.86	0.00	4.50	964.3	0.104E-02	0.83	175.72	4.50	3.67
586.74	0.00	4.50	989.1	0.101E-02	0.83	180.96	4.50	3.67
611.63	0.00	4.50	1014.7	0.985E-03	0.82	186.12	4.50	3.68
636.52	0.00	4.50	1041.3	0.960E-03	0.82	191.19	4.50	3.68
661.41	0.00	4.50	1068.8	0.936E-03	0.82	196.20	4.50	3.68
686.29	0.00	4.50	1097.2	0.911E-03	0.82	201.13	4.50	3.68
711.18	0.00	4.50	1126.7	0.888E-03	0.83	205.99	4.50	3.67
736.07	0.00	4.50	1157.2	0.864E-03	0.83	210.79	4.50	3.67
760.96	0.00	4.50	1188.7	0.841E-03	0.83	215.52	4.50	3.67
785.84	0.00	4.50	1221.3	0.819E-03	0.84	220.21	4.50	3.66
810.73	0.00	4.50	1254.9	0.797E-03	0.84	224.83	4.50	3.66
835.62	0.00	4.50	1289.6	0.775E-03	0.85	229.41	4.50	3.65
860.51	0.00	4.50	1325.5	0.754E-03	0.86	233.93	4.50	3.64
885.39	0.00	4.50	1362.5	0.734E-03	0.86	238.41	4.50	3.64
910.28	0.00	4.50	1400.6	0.714E-03	0.87	242.84	4.50	3.63
935.17	0.00	4.50	1439.9	0.694E-03	0.88	247.23	4.50	3.62
960.06	0.00	4.50	1480.4	0.675E-03	0.89	251.58	4.50	3.61
984.94	0.00	4.50	1522.1	0.657E-03	0.90	255.89	4.50	3.60
1009.83	0.00	4.50	1565.0	0.639E-03	0.91	260.16	4.50	3.59
1034.72	0.00	4.50	1609.1	0.621E-03	0.92	264.40	4.50	3.58
1059.61	0.00	4.50	1654.4	0.604E-03	0.93	268.60	4.50	3.57
1084.49	0.00	4.50	1701.0	0.588E-03	0.94	272.77	4.50	3.56
1109.38	0.00	4.50	1748.9	0.572E-03	0.95	276.90	4.50	3.55
1134.27	0.00	4.50	1798.0	0.556E-03	0.97	281.00	4.50	3.53
1159.16	0.00	4.50	1848.4	0.541E-03	0.98	285.07	4.50	3.52
1184.04	0.00	4.50	1900.1	0.526E-03	0.99	289.12	4.50	3.51
1208.93	0.00	4.50	1953.1	0.512E-03	1.01	293.13	4.50	3.49
1233.82	0.00	4.50	2007.5	0.498E-03	1.02	297.12	4.50	3.48
1258.71	0.00	4.50	2063.2	0.485E-03	1.04	301.08	4.50	3.46
1283.59	0.00	4.50	2120.2	0.472E-03	1.05	305.02	4.50	3.45

Cumulative travel time = 30142.9121 sec

Plume is ATTACHED to LEFT bank/shore.
Plume width is now determined from LEFT bank/shore.

Plume Stage 2 (bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
1283.59	305.00	4.50	2120.2	0.472E-03	1.05	610.00	4.50	3.45
1297.92	305.00	4.50	2151.4	0.465E-03	1.06	612.09	4.50	3.44
1312.25	305.00	4.50	2182.8	0.458E-03	1.07	614.19	4.50	3.43
1326.58	305.00	4.50	2214.4	0.452E-03	1.09	616.28	4.50	3.41
1340.91	305.00	4.50	2246.2	0.445E-03	1.10	618.37	4.50	3.40
1355.23	305.00	4.50	2278.3	0.439E-03	1.11	620.46	4.50	3.39
1369.56	305.00	4.50	2310.6	0.433E-03	1.12	622.55	4.50	3.38

1383.89	305.00	4.50	2343.1	0.427E-03	1.13	624.63	4.50	3.37
1398.22	305.00	4.50	2375.8	0.421E-03	1.15	626.72	4.50	3.35
1412.55	305.00	4.50	2408.7	0.415E-03	1.16	628.80	4.50	3.34
1426.88	305.00	4.50	2441.9	0.410E-03	1.17	630.88	4.50	3.33
1441.20	305.00	4.50	2475.3	0.404E-03	1.18	632.96	4.50	3.32
1455.53	305.00	4.50	2508.9	0.399E-03	1.19	635.04	4.50	3.31
1469.86	305.00	4.50	2542.8	0.393E-03	1.21	637.12	4.50	3.29
1484.19	305.00	4.50	2576.9	0.388E-03	1.22	639.20	4.50	3.28
1498.52	305.00	4.50	2611.2	0.383E-03	1.23	641.27	4.50	3.27
1512.84	305.00	4.50	2645.7	0.378E-03	1.24	643.34	4.50	3.26
1527.17	305.00	4.50	2680.5	0.373E-03	1.26	645.41	4.50	3.24
1541.50	305.00	4.50	2715.5	0.368E-03	1.27	647.48	4.50	3.23
1555.83	305.00	4.50	2750.7	0.364E-03	1.28	649.55	4.50	3.22
1570.16	305.00	4.50	2786.1	0.359E-03	1.29	651.62	4.50	3.21
1584.48	305.00	4.50	2821.8	0.354E-03	1.31	653.68	4.50	3.19
1598.81	305.00	4.50	2857.8	0.350E-03	1.32	655.75	4.50	3.18
1613.14	305.00	4.50	2893.9	0.346E-03	1.33	657.81	4.50	3.17
1627.47	305.00	4.50	2930.3	0.341E-03	1.34	659.87	4.50	3.16
1641.80	305.00	4.50	2966.9	0.337E-03	1.36	661.92	4.50	3.14
1656.13	305.00	4.50	3003.7	0.333E-03	1.37	663.98	4.50	3.13
1670.45	305.00	4.50	3040.8	0.329E-03	1.38	666.04	4.50	3.12
1684.78	305.00	4.50	3078.1	0.325E-03	1.39	668.09	4.50	3.11
1699.11	305.00	4.50	3115.7	0.321E-03	1.41	670.14	4.50	3.09
1713.44	305.00	4.50	3153.5	0.317E-03	1.42	672.19	4.50	3.08
1727.77	305.00	4.50	3191.5	0.313E-03	1.43	674.24	4.50	3.07
1742.09	305.00	4.50	3229.8	0.310E-03	1.44	676.29	4.50	3.06
1756.42	305.00	4.50	3268.3	0.306E-03	1.46	678.33	4.50	3.04
1770.75	305.00	4.50	3307.0	0.302E-03	1.47	680.37	4.50	3.03
1785.08	305.00	4.50	3346.0	0.299E-03	1.48	682.42	4.50	3.02
1799.41	305.00	4.50	3385.2	0.295E-03	1.50	684.46	4.50	3.00
1813.73	305.00	4.50	3424.6	0.292E-03	1.51	686.49	4.50	2.99
1828.06	305.00	4.50	3464.3	0.289E-03	1.52	688.53	4.50	2.98
1842.39	305.00	4.50	3504.2	0.285E-03	1.53	690.57	4.50	2.97
1856.72	305.00	4.50	3544.4	0.282E-03	1.55	692.60	4.50	2.95
1871.05	305.00	4.50	3584.8	0.279E-03	1.56	694.63	4.50	2.94
1885.38	305.00	4.50	3625.4	0.276E-03	1.57	696.66	4.50	2.93
1899.70	305.00	4.50	3666.3	0.273E-03	1.59	698.69	4.50	2.91
1914.03	305.00	4.50	3707.5	0.270E-03	1.60	700.71	4.50	2.90
1928.36	305.00	4.50	3748.8	0.267E-03	1.61	702.74	4.50	2.89
1942.69	305.00	4.50	3790.5	0.264E-03	1.63	704.76	4.50	2.87
1957.02	305.00	4.50	3832.3	0.261E-03	1.64	706.78	4.50	2.86
1971.34	305.00	4.50	3874.4	0.258E-03	1.65	708.80	4.50	2.85
1985.67	305.00	4.50	3916.8	0.255E-03	1.67	710.82	4.50	2.83
2000.00	305.00	4.50	3959.4	0.253E-03	1.68	712.84	4.50	2.82

Cumulative travel time = 47200.1914 sec

Simulation limit based on maximum specified distance = 2000.00 m.
This is the REGION OF INTEREST limitation.

END OF MOD241: BUOYANT AMBIENT SPREADING

CORMIX2: Multiport Diffuser Discharges End of Prediction File

2222222222222222222222222222222222222222222222222222222222222222222222222222222222

```
CORMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222222222
                    CORMIX MIXING ZONE EXPERT SYSTEM
        Subsystem CORMIX2:  Multiport Diffuser Discharges
                         CORMIX Version 5.0GT
                    HYDRO2 Version 5.0.1.0 December 2007
------------------------------------------------------------------------------
------------------------------------------------------------------------------
CASE DESCRIPTION
 Site name/label:
 Design case:
 FILE NAME:          C:\...5928\cormix\Area10b\8port_lower_flow\dry_u090.prd
 Time stamp:         Thu Oct 20 10:31:30 2016

ENVIRONMENT PARAMETERS (metric units)
 Unbounded section
 HA    =       4.50  HD    =       4.50
 UA    =      0.076  F     =      0.019 USTAR =0.3705E-02
 UW    =      2.000 UWSTAR=0.2198E-02
 Uniform density environment
 STRCND=  U          RHOAM = 1022.0000

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:      DITYPE= alternating_perpendicular
 BANK  =  LEFT       DISTB =     305.00  YB1   =     300.00  YB2   =     310.00
 LD    =     10.00   NOPEN =          8  SPAC  =       1.43
 D0    =     0.045 A0    =      0.002 H0    =       0.00  SUB0  =       4.50
 Nozzle/port arrangement:   alternating_without_fanning
 GAMMA =      90.00  THETA =       0.00  SIGMA =       0.00  BETA  =      90.00
 U0    =      0.998  Q0    =      0.013        =0.1270E-01
 RHO0  = 1000.0000  DRHO0 =0.2200E+02  GP0   =0.2111E+00
 C0    =0.1000E+01  CUNITS=  mg/l
 IPOLL =  1         KS    =0.0000E+00  KD    =0.0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0    =0.1270E-02  m0    =0.1268E-02  j0    =0.2681E-03  SIGNJ0=       1.0
 Associated 2-d length scales (meters)
 lQ=B  =     0.001  lM    =      0.31  lm    =      0.22
 lmp   =  99999.00  lbp   =  99999.00  la    =  99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0    =0.1270E-01  M0    =0.1268E-01  J0    =0.2681E-02
 Associated 3-d length scales (meters)
 LQ    =      0.04  LM    =      0.73  Lm    =      1.48  Lb    =      6.11
                                        Lmp   =  99999.00  Lbp   =  99999.00

NON-DIMENSIONAL PARAMETERS
 FR0   =     60.90  FRD0  =     10.24  R     =     13.13  PL    =      73.
 (slot)             (port/nozzle)

RECOMPUTED SOURCE CONDITIONS FOR ALTERNATING JETS OR RISER GROUPS:
 Momentum fluxes:    m0    =0.8909E-04  M0    =0.8909E-03
 lQ=B  =     0.018  lM    =      0.02  lm    =      0.02  lmp   =  99999.00
 LQ    =     0.030  LM    =      0.10  Lm    =      0.39  Lmp   =  99999.00
 Properties of riser group with  1 ports/nozzles each:
 U0    =     0.070  D0    =     0.170  A0    =     0.023  THETA =      90.00
 FR0   =      1.13  FRD0  =      0.37  R     =      0.92
 (slot)             (riser group)

FLOW CLASSIFICATION
 22222222222222222222222222222222222222222
 2  Flow class (CORMIX2)      =    MU8    2
 2  Applicable layer depth HS =      4.50  2
 22222222222222222222222222222222222222222

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.1000E+01  CUNITS=  mg/l
 NTOX  =  0
```

```
 NSTD  =  1          CSTD  =0.4700E-02
 REGMZ =  0
 XINT  =   2000.00  XMAX  =   2000.00

X-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the bottom and the diffuser mid-point:
       305.00 m  from the LEFT  bank/shore.
    X-axis points downstream, Y-axis points to left, Z-axis points upward.
NSTEP =  50 display intervals per module
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
BEGIN MOD201: DIFFUSER DISCHARGE MODULE

 Due to complex near-field motions:  EQUIVALENT SLOT DIFFUSER (2-D) GEOMETRY

 Profile definitions:
   BV = Gaussian 1/e (37%) half-width, in vertical plane normal to trajectory
   BH = top-hat half-width, in horizontal plane normal to trajectory
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)

       X        Y        Z        S        C        BV       BH
    0.00     0.00     0.00     1.0 0.100E+01   0.01     5.00

END OF MOD201: DIFFUSER DISCHARGE MODULE
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
BEGIN MOD234: UNSTABLE RECIRCULATION REGION OVER LAYER DEPTH

 INITIAL LOCAL VERTICAL INSTABILITY REGION:
   Bulk dilution (S = 292.49) occurs in a limited region (horizontal extent
   =    0.30 m) surrounding the discharge location.

  Control volume inflow:
       X        Y        Z        S        C        BV       BH
    0.00     0.00     0.00     1.0 0.100E+01   0.01     5.00

  Control volume outflow:
       X        Y        Z        S        C        BV       BH
    0.30     0.00     2.25   292.5 0.342E-02   4.50    16.25

END OF MOD234: UNSTABLE RECIRCULATION REGION OVER LAYER DEPTH
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
BEGIN MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY

 UPSTREAM INTRUSION PROPERTIES:
       Upstream intrusion length              =       0.57 m
       X-position of upstream stagnation point =      -0.27 m
       Thickness in intrusion region          =       1.22 m
       Half-width at downstream end           =       7.48 m
       Thickness at downstream end            =       3.54 m

  Control volume inflow:
       X        Y        Z        S        C        BV       BH
    0.30     0.00     2.25   292.5 0.342E-02   4.50    16.25

** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **
 The pollutant concentration in the plume falls below water quality standard
   or CCC value of 0.470E-02 due to mixing in this control volume.
 The actual extent of the zone at whose boundary the water quality
   standard or the CCC is exceeded will be smaller than the control
   volume outflow values predicted below.

 Profile definitions:
   BV = top-hat thickness, measured vertically
   BH = top-hat half-width, measured horizontally in y-direction
   ZU = upper plume boundary (Z-coordinate)
```

ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic average (bulk) dilution
C = average (bulk) concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH	ZU	ZL
-0.27	0.00	4.50	9999.9	0.000E+00	0.00	0.00	4.50	4.50
-0.19	0.00	4.50	603.4	0.166E-02	0.59	6.31	4.50	3.91
0.24	0.00	4.50	294.7	0.339E-02	1.21	15.34	4.50	3.29
0.66	0.00	4.50	293.4	0.341E-02	1.30	12.17	4.50	3.20
1.08	0.00	4.50	296.4	0.337E-02	1.59	11.33	4.50	2.91
1.50	0.00	4.50	300.8	0.332E-02	2.01	10.62	4.50	2.49
1.93	0.00	4.50	305.4	0.327E-02	2.45	9.98	4.50	2.05
2.35	0.00	4.50	309.5	0.323E-02	2.84	9.41	4.50	1.66
2.77	0.00	4.50	312.6	0.320E-02	3.14	8.88	4.50	1.36
3.19	0.00	4.50	314.7	0.318E-02	3.33	8.38	4.50	1.17
3.62	0.00	4.50	315.8	0.317E-02	3.44	7.92	4.50	1.06
4.04	0.00	4.50	316.9	0.316E-02	3.54	7.48	4.50	0.96

Cumulative travel time = 49.1919 sec

END OF MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY

** End of NEAR-FIELD REGION (NFR) **

BEGIN MOD241: BUOYANT AMBIENT SPREADING

Profile definitions:
BV = top-hat thickness, measured vertically
BH = top-hat half-width, measured horizontally in y-direction
ZU = upper plume boundary (Z-coordinate)
ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic average (bulk) dilution
C = average (bulk) concentration (includes reaction effects, if any)

Plume Stage 1 (not bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
4.04	0.00	4.50	316.9	0.316E-02	3.54	7.48	4.50	0.96
43.96	0.00	4.50	410.2	0.244E-02	1.65	20.71	4.50	2.85
83.88	0.00	4.50	455.3	0.220E-02	1.25	30.42	4.50	3.25
123.80	0.00	4.50	490.1	0.204E-02	1.06	38.73	4.50	3.44
163.71	0.00	4.50	521.7	0.192E-02	0.94	46.20	4.50	3.56
203.63	0.00	4.50	553.0	0.181E-02	0.87	53.08	4.50	3.63
243.55	0.00	4.50	585.6	0.171E-02	0.82	59.51	4.50	3.68
283.47	0.00	4.50	620.3	0.161E-02	0.79	65.59	4.50	3.71
323.39	0.00	4.50	657.8	0.152E-02	0.77	71.38	4.50	3.73
363.31	0.00	4.50	698.5	0.143E-02	0.76	76.94	4.50	3.74
403.23	0.00	4.50	742.9	0.135E-02	0.75	82.28	4.50	3.75
443.15	0.00	4.50	791.3	0.126E-02	0.76	87.45	4.50	3.74
483.07	0.00	4.50	843.8	0.119E-02	0.76	92.45	4.50	3.74
522.99	0.00	4.50	900.7	0.111E-02	0.77	97.32	4.50	3.73
562.91	0.00	4.50	962.3	0.104E-02	0.79	102.06	4.50	3.71
602.83	0.00	4.50	1028.7	0.972E-03	0.81	106.69	4.50	3.69
642.75	0.00	4.50	1100.0	0.909E-03	0.83	111.22	4.50	3.67
682.66	0.00	4.50	1176.4	0.850E-03	0.85	115.66	4.50	3.65
722.58	0.00	4.50	1258.1	0.795E-03	0.88	120.01	4.50	3.62
762.50	0.00	4.50	1345.2	0.743E-03	0.90	124.28	4.50	3.60
802.42	0.00	4.50	1437.7	0.696E-03	0.93	128.48	4.50	3.57
842.34	0.00	4.50	1535.9	0.651E-03	0.97	132.61	4.50	3.53
882.26	0.00	4.50	1639.8	0.610E-03	1.00	136.68	4.50	3.50
922.18	0.00	4.50	1749.5	0.572E-03	1.04	140.69	4.50	3.46
962.10	0.00	4.50	1865.2	0.536E-03	1.08	144.65	4.50	3.42
1002.02	0.00	4.50	1986.9	0.503E-03	1.12	148.55	4.50	3.38
1041.94	0.00	4.50	2114.7	0.473E-03	1.16	152.41	4.50	3.34
1081.86	0.00	4.50	2248.8	0.445E-03	1.20	156.21	4.50	3.30
1121.78	0.00	4.50	2389.2	0.419E-03	1.25	159.98	4.50	3.25
1161.70	0.00	4.50	2536.0	0.394E-03	1.29	163.70	4.50	3.21
1201.62	0.00	4.50	2689.3	0.372E-03	1.34	167.38	4.50	3.16
1241.53	0.00	4.50	2849.1	0.351E-03	1.39	171.03	4.50	3.11
1281.45	0.00	4.50	3015.7	0.332E-03	1.44	174.64	4.50	3.06

1321.37	0.00	4.50	3189.0	0.314E-03	1.50	178.21	4.50	3.00
1361.29	0.00	4.50	3369.1	0.297E-03	1.55	181.75	4.50	2.95
1401.21	0.00	4.50	3556.1	0.281E-03	1.60	185.26	4.50	2.90
1441.13	0.00	4.50	3750.0	0.267E-03	1.66	188.73	4.50	2.84
1481.05	0.00	4.50	3951.0	0.253E-03	1.72	192.18	4.50	2.78
1520.97	0.00	4.50	4159.2	0.240E-03	1.78	195.60	4.50	2.72
1560.89	0.00	4.50	4374.5	0.229E-03	1.84	198.99	4.50	2.66
1600.81	0.00	4.50	4597.1	0.218E-03	1.90	202.35	4.50	2.60
1640.73	0.00	4.50	4827.0	0.207E-03	1.96	205.69	4.50	2.54
1680.65	0.00	4.50	5064.3	0.197E-03	2.02	209.00	4.50	2.48
1720.57	0.00	4.50	5309.0	0.188E-03	2.09	212.29	4.50	2.41
1760.49	0.00	4.50	5561.3	0.180E-03	2.16	215.56	4.50	2.34
1800.40	0.00	4.50	5821.1	0.172E-03	2.22	218.80	4.50	2.28
1840.32	0.00	4.50	6088.6	0.164E-03	2.29	222.02	4.50	2.21
1880.24	0.00	4.50	6363.9	0.157E-03	2.36	225.22	4.50	2.14
1920.16	0.00	4.50	6646.9	0.150E-03	2.43	228.39	4.50	2.07
1960.08	0.00	4.50	6937.7	0.144E-03	2.50	231.55	4.50	2.00
2000.00	0.00	4.50	7236.4	0.138E-03	2.58	234.68	4.50	1.92

Cumulative travel time = 26311.8594 sec

Simulation limit based on maximum specified distance = 2000.00 m.
This is the REGION OF INTEREST limitation.

END OF MOD241: BUOYANT AMBIENT SPREADING

CORMIX2: Multiport Diffuser Discharges End of Prediction File
2222222222222222222222222222222222222222222222222222222222222222222222222222

```
CORMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222222222
                    CORMIX MIXING ZONE EXPERT SYSTEM
          Subsystem CORMIX2:  Multiport Diffuser Discharges
                       CORMIX Version 5.0GT
                   HYDRO2 Version 5.0.1.0 December 2007
------------------------------------------------------------------------------
------------------------------------------------------------------------------
CASE DESCRIPTION
 Site name/label:
 Design case:
 FILE NAME:          C:\...5928\cormix\Area10b\8port_lower_flow\wet_u010.prd
 Time stamp:         Thu Oct 20 10:31:43 2016

ENVIRONMENT PARAMETERS (metric units)
 Unbounded section
 HA     =       4.50  HD     =       4.50
 UA     =      0.013  F      =      0.019 USTAR =0.6338E-03
 UW     =      2.000 UWSTAR=0.2198E-02
 Density stratified environment
 STRCND=  A           RHOAM = 1017.3500
 RHOAS = 1017.0000   RHOAB = 1017.7000  RHOAH0= 1017.7000  E      =0.1499E-02

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:      DITYPE= alternating_perpendicular
 BANK  =  LEFT       DISTB =     305.00  YB1   =     300.00  YB2   =     310.00
 LD     =     10.00  NOPEN =       8     SPAC  =       1.43
 D0     =     0.045  A0     =     0.002 H0     =       0.00  SUB0  =       4.50
 Nozzle/port arrangement:   alternating_without_fanning
 GAMMA =      90.00  THETA =       0.00  SIGMA =       0.00  BETA  =      90.00
 U0     =      0.998  Q0     =      0.013        =0.1270E-01
 RHO0   = 1000.0000  DRHO0 =0.1770E+02  GP0   =0.1706E+00
 C0     =0.1000E+01  CUNITS=  mg/l
 IPOLL =  1          KS     =0.0000E+00  KD    =0.0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0     =0.1270E-02  m0     =0.1268E-02  j0    =0.2166E-03  SIGNJ0=       1.0
 Associated 2-d length scales (meters)
 lQ=B   =      0.001 lM     =       0.35  lm    =       7.50
 lmp    =       0.95  lbp    =       1.55  la    =       0.34

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0     =0.1270E-01  M0     =0.1268E-01  J0    =0.2166E-02
 Associated 3-d length scales (meters)
 LQ     =       0.04  LM     =       0.81  Lm    =       8.66  Lb    =     985.93
                                           Lmp   =       1.71  Lbp   =       2.47

NON-DIMENSIONAL PARAMETERS
 FR0    =      67.76  FRD0   =      11.39  R     =      76.78  PL    =       68.
 (slot)              (port/nozzle)

RECOMPUTED SOURCE CONDITIONS FOR ALTERNATING JETS OR RISER GROUPS:
 Momentum fluxes:    m0     =0.8181E-04  M0    =0.8181E-03
 lQ=B   =      0.020 lM     =       0.02  lm    =       0.48  lmp   =       0.38
 LQ     =      0.029 LM     =       0.10  Lm    =       2.20  Lmp   =       0.86
 Properties of riser group with  1 ports/nozzles each:
 U0     =      0.064 D0     =      0.177 A0    =      0.025 THETA =      90.00
 FR0    =       1.11  FRD0   =       0.37  R     =       4.95
 (slot)              (riser group)

FLOW CLASSIFICATION
 22222222222222222222222222222222222222222
 2  Flow class (CORMIX2)      =    MS8    2
 2  Applicable layer depth HS =     4.50  2
 22222222222222222222222222222222222222222

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0     =0.1000E+01  CUNITS=  mg/l
```

```
 NTOX   =  0
 NSTD   =  1          CSTD  =0.4700E-02
 REGMZ  =  0
 XINT   =   2000.00  XMAX  =   2000.00

X-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the bottom and the diffuser mid-point:
       305.00 m  from the LEFT  bank/shore.
    X-axis points downstream, Y-axis points to left, Z-axis points upward.
NSTEP =  50 display intervals per module
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
BEGIN MOD101: DISCHARGE MODULE (SINGLE PORT AT DIFFUSER CENTER)

       X        Y        Z        S        C        BV       BH
    0.00     0.00     0.00      1.0 0.100E+01   0.09     0.09

END OF MOD101: DISCHARGE MODULE (SINGLE PORT AT DIFFUSER CENTER)
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
BEGIN CORJET (MOD110): JET/PLUME NEAR-FIELD MIXING REGION

 Plume-like motion in linear stratification with weak crossflow.

 Zone of flow establishment:              THETAE=     85.22  SIGMAE=      0.00
  LE    =      0.12  XE    =      0.00  YE    =      0.00  ZE    =      0.12

 Profile definitions:
   BV = Gaussian 1/e (37%) half-width, in vertical plane normal to trajectory
   BH = before merging: Gaussian 1/e (37%) half-width in horizontal plane
                        normal to trajectory
        after merging:  top-hat half-width in horizontal plane
                        parallel to diffuser line
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)

       X        Y        Z        S        C        BV       BH
 Individual jet/plumes before merging:
    0.00     0.00     0.12      1.0 0.100E+01   0.09     0.09
    0.00     0.00     0.12      1.0 0.100E+01   0.09     0.09
    0.12     0.00     0.35      1.9 0.532E+00   0.07     0.07
    0.28     0.00     0.56      3.6 0.280E+00   0.11     0.11
    0.46     0.00     0.75      5.6 0.178E+00   0.14     0.14
    0.65     0.00     0.93      7.9 0.127E+00   0.17     0.17
    0.87     0.00     1.07     10.3 0.971E-01   0.20     0.20
    1.10     0.00     1.20     12.7 0.786E-01   0.23     0.23
    1.34     0.00     1.31     15.2 0.659E-01   0.26     0.26
    1.58     0.00     1.40     17.6 0.568E-01   0.29     0.29
    1.83     0.00     1.48     20.0 0.499E-01   0.32     0.32
    2.08     0.00     1.55     22.4 0.446E-01   0.34     0.34
    2.34     0.00     1.61     24.8 0.403E-01   0.37     0.37
    2.60     0.00     1.66     27.2 0.367E-01   0.39     0.39
    2.86     0.00     1.71     29.6 0.338E-01   0.41     0.41
    3.11     0.00     1.75     32.0 0.313E-01   0.44     0.44
    3.37     0.00     1.80     34.4 0.291E-01   0.46     0.46
    3.63     0.00     1.84     36.8 0.272E-01   0.48     0.48
    3.89     0.00     1.88     39.3 0.254E-01   0.51     0.51
    4.15     0.00     1.92     41.8 0.239E-01   0.53     0.53
    4.41     0.00     1.96     44.4 0.225E-01   0.55     0.55
    4.67     0.00     1.99     47.0 0.213E-01   0.58     0.58
    4.93     0.00     2.03     49.6 0.202E-01   0.60     0.60
    5.19     0.00     2.07     52.2 0.192E-01   0.62     0.62
    5.45     0.00     2.10     54.9 0.182E-01   0.64     0.64
    5.71     0.00     2.14     57.6 0.174E-01   0.66     0.66
    5.97     0.00     2.17     60.3 0.166E-01   0.69     0.69
    6.23     0.00     2.20     63.0 0.159E-01   0.71     0.71
 Merging of individual jet/plumes to form plane jet/plume:
    6.28     0.00     2.21     82.5 0.121E-01   0.90     5.90
```

6.75	0.00	2.26	85.8	0.117E-01	0.94	5.94
7.01	0.00	2.28	87.6	0.114E-01	0.97	5.97
7.27	0.00	2.31	89.4	0.112E-01	1.00	6.00
7.53	0.00	2.33	91.1	0.110E-01	1.02	6.02
7.80	0.00	2.36	92.8	0.108E-01	1.05	6.05
8.06	0.00	2.38	94.5	0.106E-01	1.08	6.08
8.32	0.00	2.40	96.2	0.104E-01	1.11	6.11
8.58	0.00	2.43	97.8	0.102E-01	1.13	6.13
8.84	0.00	2.45	99.5	0.101E-01	1.16	6.16
9.10	0.00	2.47	101.1	0.990E-02	1.19	6.19
9.36	0.00	2.49	102.6	0.974E-02	1.22	6.22
9.62	0.00	2.51	104.2	0.960E-02	1.25	6.25
9.89	0.00	2.52	105.7	0.946E-02	1.28	6.28
10.15	0.00	2.54	107.2	0.932E-02	1.31	6.31
10.41	0.00	2.56	108.7	0.920E-02	1.34	6.34
10.67	0.00	2.57	110.2	0.908E-02	1.37	6.37
10.93	0.00	2.59	111.6	0.896E-02	1.39	6.39
11.20	0.00	2.60	113.0	0.885E-02	1.42	6.42
11.46	0.00	2.61	114.4	0.874E-02	1.45	6.45
11.72	0.00	2.62	115.7	0.864E-02	1.48	6.48
11.98	0.00	2.63	117.0	0.855E-02	1.51	6.51
12.24	0.00	2.64	118.2	0.846E-02	1.53	6.53
12.50	0.00	2.64	119.4	0.838E-02	1.56	6.56

Terminal level in stratified ambient has been reached.
Cumulative travel time = 157.1202 sec

END OF CORJET (MOD110): JET/PLUME NEAR-FIELD MIXING REGION

BEGIN MOD236: TERMINAL LAYER IMPINGEMENT/UPSTREAM SPREADING

Vertical angle of layer/boundary impingement = 1.24 deg
Horizontal angle of layer/boundary impingement = 0.00 deg

UPSTREAM INTRUSION PROPERTIES:

Maximum elevation of jet/plume rise	=	4.07 m
Layer thickness in impingement region	=	0.81 m
Upstream intrusion length	=	5.64 m
X-position of upstream stagnation point	=	6.86 m
Thickness in intrusion region	=	0.81 m
Half-width at downstream end	=	44.78 m
Thickness at downstream end	=	1.62 m

Control volume inflow:

X	Y	Z	S	C	BV	BH
12.50	0.00	2.64	119.4	0.838E-02	1.56	6.56

Profile definitions:
BV = top-hat thickness, measured vertically
BH = top-hat half-width, measured horizontally in y-direction
ZU = upper plume boundary (Z-coordinate)
ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic average (bulk) dilution
C = average (bulk) concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH	ZU	ZL
6.86	0.00	2.64	9999.9	0.000E+00	0.00	0.00	2.64	2.64

** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **
The pollutant concentration in the plume falls below water quality standard or CCC value of 0.470E-02 in the current prediction interval.
This is the spatial extent of concentrations exceeding the water quality standard or CCC value.

7.42	0.00	2.64	302.9	0.330E-02	0.32	6.33	2.80	2.48
10.17	0.00	2.64	133.8	0.747E-02	0.72	15.38	3.00	2.28
12.92	0.00	2.64	119.4	0.837E-02	0.81	31.56	3.05	2.24
15.66	0.00	2.64	121.6	0.822E-02	0.87	33.92	3.08	2.21
18.41	0.00	2.64	126.5	0.790E-02	1.00	35.94	3.14	2.14
21.16	0.00	2.64	132.6	0.754E-02	1.17	37.72	3.23	2.06

23.90	0.00	2.64	138.3	0.723E-02	1.33	39.34	3.31	1.98
26.65	0.00	2.64	142.7	0.701E-02	1.46	40.83	3.37	1.91
29.40	0.00	2.64	145.7	0.687E-02	1.54	42.23	3.41	1.87
32.15	0.00	2.64	147.3	0.679E-02	1.58	43.54	3.43	1.85
34.89	0.00	2.64	148.7	0.673E-02	1.62	44.78	3.45	1.83

Cumulative travel time = 1879.2767 sec

END OF MOD236: TERMINAL LAYER IMPINGEMENT/UPSTREAM SPREADING

** End of NEAR-FIELD REGION (NFR) **

BEGIN MOD242: BUOYANT TERMINAL LAYER SPREADING

Profile definitions:
- BV = top-hat thickness, measured vertically
- BH = top-hat half-width, measured horizontally in y-direction
- ZU = upper plume boundary (z-coordinate)
- ZL = lower plume boundary (z-coordinate)
- S = hydrodynamic average (bulk) dilution
- C = average (bulk) concentration (includes reaction effects, if any)

Plume Stage 1 (not bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
34.89	0.00	2.64	148.7	0.673E-02	1.62	44.78	3.45	1.83
39.53	0.00	2.64	159.6	0.627E-02	1.32	59.27	3.30	1.98
44.16	0.00	2.64	167.3	0.598E-02	1.15	71.33	3.22	2.07
48.80	0.00	2.64	173.4	0.577E-02	1.03	81.90	3.16	2.13
53.43	0.00	2.64	178.4	0.560E-02	0.95	91.43	3.12	2.17
58.06	0.00	2.64	182.8	0.547E-02	0.89	100.18	3.09	2.20
62.70	0.00	2.64	186.7	0.536E-02	0.84	108.31	3.06	2.22
67.33	0.00	2.64	190.1	0.526E-02	0.80	115.93	3.04	2.24
71.97	0.00	2.64	193.4	0.517E-02	0.77	123.13	3.03	2.26
76.60	0.00	2.64	196.3	0.509E-02	0.74	129.96	3.01	2.27
81.24	0.00	2.64	199.2	0.502E-02	0.71	136.49	3.00	2.29
85.87	0.00	2.64	201.8	0.495E-02	0.69	142.74	2.99	2.30
90.50	0.00	2.64	204.4	0.489E-02	0.67	148.75	2.98	2.31
95.14	0.00	2.64	206.8	0.483E-02	0.65	154.55	2.97	2.32
99.77	0.00	2.64	209.2	0.478E-02	0.64	160.15	2.96	2.32
104.41	0.00	2.64	211.5	0.473E-02	0.62	165.58	2.95	2.33
109.04	0.00	2.64	213.8	0.468E-02	0.61	170.85	2.95	2.34
113.68	0.00	2.64	216.0	0.463E-02	0.60	175.97	2.94	2.34
118.31	0.00	2.64	218.2	0.458E-02	0.59	180.96	2.94	2.35
122.94	0.00	2.64	220.4	0.454E-02	0.58	185.83	2.93	2.35
127.58	0.00	2.64	222.6	0.449E-02	0.57	190.59	2.93	2.36
132.21	0.00	2.64	224.7	0.445E-02	0.56	195.24	2.92	2.36
136.85	0.00	2.64	226.8	0.441E-02	0.55	199.80	2.92	2.37
141.48	0.00	2.64	229.0	0.437E-02	0.55	204.26	2.92	2.37
146.12	0.00	2.64	231.1	0.433E-02	0.54	208.64	2.91	2.37
150.75	0.00	2.64	233.2	0.429E-02	0.53	212.95	2.91	2.38
155.38	0.00	2.64	235.3	0.425E-02	0.53	217.18	2.91	2.38
160.02	0.00	2.64	237.5	0.421E-02	0.52	221.34	2.90	2.38
164.65	0.00	2.64	239.6	0.417E-02	0.52	225.44	2.90	2.38
169.29	0.00	2.64	241.8	0.414E-02	0.51	229.48	2.90	2.39
173.92	0.00	2.64	243.9	0.410E-02	0.51	233.46	2.90	2.39
178.56	0.00	2.64	246.1	0.406E-02	0.51	237.39	2.90	2.39
183.19	0.00	2.64	248.3	0.403E-02	0.50	241.27	2.89	2.39
187.82	0.00	2.64	250.5	0.399E-02	0.50	245.10	2.89	2.39
192.46	0.00	2.64	252.8	0.396E-02	0.50	248.89	2.89	2.39
197.09	0.00	2.64	255.0	0.392E-02	0.49	252.63	2.89	2.40
201.73	0.00	2.64	257.3	0.389E-02	0.49	256.34	2.89	2.40
206.36	0.00	2.64	259.5	0.385E-02	0.49	260.01	2.89	2.40
211.00	0.00	2.64	261.8	0.382E-02	0.49	263.64	2.89	2.40
215.63	0.00	2.64	264.1	0.379E-02	0.48	267.24	2.88	2.40
220.26	0.00	2.64	266.5	0.375E-02	0.48	270.80	2.88	2.40
224.90	0.00	2.64	268.8	0.372E-02	0.48	274.34	2.88	2.40
229.53	0.00	2.64	271.2	0.369E-02	0.48	277.85	2.88	2.40
234.17	0.00	2.64	273.6	0.366E-02	0.48	281.33	2.88	2.40
238.80	0.00	2.64	276.0	0.362E-02	0.47	284.78	2.88	2.41

243.44	0.00	2.64	278.4	0.359E-02	0.47	288.21	2.88	2.41
248.07	0.00	2.64	280.9	0.356E-02	0.47	291.62	2.88	2.41
252.70	0.00	2.64	283.4	0.353E-02	0.47	295.00	2.88	2.41
257.34	0.00	2.64	285.9	0.350E-02	0.47	298.36	2.88	2.41
261.97	0.00	2.64	288.4	0.347E-02	0.47	301.70	2.88	2.41
266.61	0.00	2.64	290.9	0.344E-02	0.47	305.03	2.88	2.41

Cumulative travel time = 19703.4395 sec

Plume is ATTACHED to LEFT bank/shore.
Plume width is now determined from LEFT bank/shore.

Plume Stage 2 (bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
266.61	305.00	2.64	290.9	0.344E-02	0.47	610.00	2.88	2.41
301.27	305.00	2.64	306.2	0.327E-02	0.47	630.24	2.88	2.41
335.94	305.00	2.64	321.6	0.311E-02	0.48	650.74	2.88	2.40
370.61	305.00	2.64	337.0	0.297E-02	0.49	671.46	2.89	2.40
405.28	305.00	2.64	352.5	0.284E-02	0.50	692.38	2.89	2.39
439.95	305.00	2.64	368.1	0.272E-02	0.50	713.46	2.89	2.39
474.61	305.00	2.64	383.8	0.261E-02	0.51	734.69	2.90	2.39
509.28	305.00	2.64	399.6	0.250E-02	0.52	756.05	2.90	2.38
543.95	305.00	2.64	415.6	0.241E-02	0.52	777.53	2.90	2.38
578.62	305.00	2.64	431.6	0.232E-02	0.53	799.11	2.91	2.38
613.29	305.00	2.64	447.8	0.223E-02	0.53	820.78	2.91	2.38
647.95	305.00	2.64	464.1	0.215E-02	0.54	842.54	2.91	2.37
682.62	305.00	2.64	480.6	0.208E-02	0.54	864.37	2.91	2.37
717.29	305.00	2.64	497.2	0.201E-02	0.55	886.27	2.92	2.37
751.96	305.00	2.64	513.9	0.195E-02	0.55	908.24	2.92	2.37
786.62	305.00	2.64	530.7	0.188E-02	0.56	930.26	2.92	2.36
821.29	305.00	2.64	547.7	0.183E-02	0.56	952.34	2.92	2.36
855.96	305.00	2.64	564.8	0.177E-02	0.57	974.47	2.93	2.36
890.63	305.00	2.64	582.1	0.172E-02	0.57	996.65	2.93	2.36
925.30	305.00	2.64	599.5	0.167E-02	0.57	1018.87	2.93	2.36
959.96	305.00	2.64	617.0	0.162E-02	0.58	1041.14	2.93	2.35
994.63	305.00	2.64	634.7	0.158E-02	0.58	1063.44	2.93	2.35
1029.30	305.00	2.64	652.4	0.153E-02	0.59	1085.77	2.94	2.35
1063.97	305.00	2.64	670.4	0.149E-02	0.59	1108.15	2.94	2.35
1098.64	305.00	2.64	688.4	0.145E-02	0.59	1130.55	2.94	2.35
1133.30	305.00	2.64	706.6	0.142E-02	0.60	1152.99	2.94	2.34
1167.97	305.00	2.64	724.9	0.138E-02	0.60	1175.45	2.94	2.34
1202.64	305.00	2.64	743.3	0.135E-02	0.61	1197.95	2.95	2.34
1237.31	305.00	2.64	761.8	0.131E-02	0.61	1220.47	2.95	2.34
1271.97	305.00	2.64	780.5	0.128E-02	0.61	1243.02	2.95	2.34
1306.64	305.00	2.64	799.3	0.125E-02	0.62	1265.59	2.95	2.33
1341.31	305.00	2.64	818.2	0.122E-02	0.62	1288.19	2.95	2.33
1375.98	305.00	2.64	837.2	0.119E-02	0.62	1310.80	2.95	2.33
1410.65	305.00	2.64	856.4	0.117E-02	0.63	1333.45	2.96	2.33
1445.31	305.00	2.64	875.6	0.114E-02	0.63	1356.11	2.96	2.33
1479.98	305.00	2.64	895.0	0.112E-02	0.63	1378.79	2.96	2.33
1514.65	305.00	2.64	914.5	0.109E-02	0.64	1401.49	2.96	2.32
1549.32	305.00	2.64	934.1	0.107E-02	0.64	1424.22	2.96	2.32
1583.99	305.00	2.64	953.9	0.105E-02	0.64	1446.96	2.96	2.32
1618.65	305.00	2.64	973.7	0.103E-02	0.65	1469.71	2.97	2.32
1653.32	305.00	2.64	993.6	0.101E-02	0.65	1492.49	2.97	2.32
1687.99	305.00	2.64	1013.7	0.986E-03	0.65	1515.28	2.97	2.32
1722.66	305.00	2.64	1033.9	0.967E-03	0.66	1538.09	2.97	2.31
1757.32	305.00	2.64	1054.2	0.949E-03	0.66	1560.92	2.97	2.31
1791.99	305.00	2.64	1074.5	0.931E-03	0.66	1583.76	2.97	2.31
1826.66	305.00	2.64	1095.0	0.913E-03	0.67	1606.61	2.98	2.31
1861.33	305.00	2.64	1115.6	0.896E-03	0.67	1629.49	2.98	2.31
1896.00	305.00	2.64	1136.3	0.880E-03	0.67	1652.37	2.98	2.31
1930.66	305.00	2.64	1157.1	0.864E-03	0.67	1675.27	2.98	2.31
1965.33	305.00	2.64	1178.0	0.849E-03	0.68	1698.18	2.98	2.30
2000.00	305.00	2.64	1199.0	0.834E-03	0.68	1721.11	2.98	2.30

Cumulative travel time = 153041.3594 sec

Simulation limit based on maximum specified distance = 2000.00 m.

This is the REGION OF INTEREST limitation.

END OF MOD242: BUOYANT TERMINAL LAYER SPREADING

CORMIX2: Multiport Diffuser Discharges End of Prediction File

```
CORMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222222222222222
                    CORMIX MIXING ZONE EXPERT SYSTEM
        Subsystem CORMIX2:  Multiport Diffuser Discharges
                         CORMIX Version 5.0GT
                    HYDRO2 Version 5.0.1.0 December 2007
------------------------------------------------------------------------------
------------------------------------------------------------------------------
CASE DESCRIPTION
 Site name/label:
 Design case:
 FILE NAME:          C:\...5928\cormix\Area10b\8port_lower_flow\wet_u050.prd
 Time stamp:         Thu Oct 20 10:32:29 2016

ENVIRONMENT PARAMETERS (metric units)
 Unbounded section
 HA    =       4.50  HD    =       4.50
 UA    =      0.042  F     =      0.019 USTAR =0.2048E-02
 UW    =      2.000  UWSTAR=0.2198E-02
 Density stratified environment
 STRCND=  A          RHOAM = 1017.3500
 RHOAS = 1017.0000   RHOAB = 1017.7000  RHOAH0= 1017.7000  E     =0.1499E-02

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:      DITYPE= alternating_perpendicular
 BANK  =  LEFT       DISTB =    305.00  YB1   =     300.00  YB2   =     310.00
 LD    =     10.00   NOPEN =         8  SPAC  =       1.43
 D0    =     0.045   A0    =     0.002  H0    =       0.00  SUB0  =       4.50
 Nozzle/port arrangement:   alternating_without_fanning
 GAMMA =     90.00   THETA =       0.00  SIGMA =       0.00  BETA  =      90.00
 U0    =     0.998   Q0    =      0.013       =0.1270E-01
 RHO0  = 1000.0000   DRHO0 =0.1770E+02  GP0   =0.1706E+00
 C0    =0.1000E+01   CUNITS=  mg/l
 IPOLL =  1          KS    =0.0000E+00  KD    =0.0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0    =0.1270E-02   m0    =0.1268E-02  j0    =0.2166E-03  SIGNJ0=       1.0
 Associated 2-d length scales (meters)
 lQ=B  =      0.001  lM    =      0.35  lm    =      0.72
 lmp   =       0.95  lbp   =      1.55  la    =      1.08

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0    =0.1270E-01   M0    =0.1268E-01  J0    =0.2166E-02
 Associated 3-d length scales (meters)
 LQ    =       0.04  LM    =      0.81  Lm    =      2.68  Lb    =     29.24
                                        Lmp   =      1.71  Lbp   =      2.47

NON-DIMENSIONAL PARAMETERS
 FR0   =     67.76   FRD0  =     11.39  R     =     23.77  PL    =      68.
 (slot)              (port/nozzle)

RECOMPUTED SOURCE CONDITIONS FOR ALTERNATING JETS OR RISER GROUPS:
 Momentum fluxes:    m0    =0.8181E-04  M0    =0.8181E-03
 lQ=B  =     0.020   lM    =      0.02  lm    =      0.05  lmp   =      0.38
 LQ    =     0.029   LM    =      0.10  Lm    =      0.68  Lmp   =      0.86
 Properties of riser group with  1 ports/nozzles each:
 U0    =     0.064   D0    =     0.177  A0    =     0.025  THETA =     90.00
 FR0   =      1.11   FRD0  =      0.37  R     =      1.53
 (slot)              (riser group)

FLOW CLASSIFICATION
 22222222222222222222222222222222222222
 2  Flow class (CORMIX2)      =    MS5    2
 2  Applicable layer depth HS =      4.50  2
 22222222222222222222222222222222222222

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.1000E+01   CUNITS=  mg/l
```

```
 NTOX   =  0
 NSTD   =  1          CSTD  =0.4700E-02
 REGMZ  =  0
 XINT   =   2000.00   XMAX  =   2000.00

X-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the bottom and the diffuser mid-point:
      305.00 m  from the LEFT  bank/shore.
    X-axis points downstream, Y-axis points to left, Z-axis points upward.
NSTEP =  50 display intervals per module
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
BEGIN MOD101: DISCHARGE MODULE (SINGLE PORT AT DIFFUSER CENTER)

       X        Y        Z        S        C          BV       BH
    0.00     0.00     0.00      1.0 0.100E+01     0.09     0.09

END OF MOD101: DISCHARGE MODULE (SINGLE PORT AT DIFFUSER CENTER)
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
BEGIN CORJET (MOD110): JET/PLUME NEAR-FIELD MIXING REGION

 Plume-like motion in linear stratification with strong crossflow.

 Zone of flow establishment:              THETAE=     74.89  SIGMAE=      0.00
  LE    =      0.00  XE    =      0.00  YE    =      0.00  ZE    =      0.00

 Profile definitions:
   BV = Gaussian 1/e (37%) half-width, in vertical plane normal to trajectory
   BH = before merging: Gaussian 1/e (37%) half-width in horizontal plane
                        normal to trajectory
        after merging:  top-hat half-width in horizontal plane
                        parallel to diffuser line
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)

       X        Y        Z        S        C          BV       BH
 Individual jet/plumes before merging:
    0.00     0.00     0.00      1.0 0.100E+01     0.09     0.09
    0.62     0.00     0.21      3.2 0.316E+00     0.10     0.10
    1.26     0.00     0.38      6.5 0.154E+00     0.16     0.16
    1.91     0.00     0.50     10.3 0.972E-01     0.20     0.20
    2.56     0.00     0.58     14.3 0.699E-01     0.25     0.25
    3.21     0.00     0.65     18.5 0.541E-01     0.29     0.29
    3.87     0.00     0.71     22.7 0.440E-01     0.33     0.33
    4.53     0.00     0.76     27.0 0.370E-01     0.37     0.37
    5.18     0.00     0.80     31.3 0.319E-01     0.40     0.40
    5.84     0.00     0.83     35.7 0.280E-01     0.44     0.44
    6.50     0.00     0.86     40.2 0.249E-01     0.47     0.47
    7.16     0.00     0.90     44.7 0.224E-01     0.50     0.50
    7.82     0.00     0.93     49.4 0.203E-01     0.53     0.53
    8.47     0.00     0.96     54.1 0.185E-01     0.56     0.56
    9.13     0.00     0.99     58.9 0.170E-01     0.59     0.59
    9.79     0.00     1.02     63.7 0.157E-01     0.61     0.61
   10.45     0.00     1.04     68.6 0.146E-01     0.64     0.64
   11.11     0.00     1.07     73.6 0.136E-01     0.67     0.67
   11.76     0.00     1.10     78.6 0.127E-01     0.69     0.69
 Merging of individual jet/plumes to form plane jet/plume:
   12.29     0.00     1.12    101.6 0.984E-02     0.90     5.90
   13.08     0.00     1.15    105.4 0.949E-02     0.93     5.93
   13.74     0.00     1.17    108.6 0.921E-02     0.96     5.96
   14.40     0.00     1.19    111.6 0.896E-02     0.99     5.99
   15.05     0.00     1.21    114.7 0.872E-02     1.02     6.02
   15.71     0.00     1.23    117.7 0.849E-02     1.05     6.05
   16.37     0.00     1.26    120.7 0.828E-02     1.08     6.08
   17.03     0.00     1.28    123.7 0.808E-02     1.11     6.11
   17.69     0.00     1.30    126.6 0.790E-02     1.14     6.14
   18.35     0.00     1.32    129.5 0.772E-02     1.17     6.17
```

19.00	0.00	1.34	132.3	0.756E-02	1.20	6.20
19.66	0.00	1.35	135.1	0.740E-02	1.23	6.23
20.32	0.00	1.37	137.9	0.725E-02	1.26	6.26
20.98	0.00	1.39	140.6	0.711E-02	1.29	6.29
21.64	0.00	1.41	143.3	0.698E-02	1.32	6.32
22.30	0.00	1.42	145.9	0.686E-02	1.35	6.35
22.96	0.00	1.44	148.4	0.674E-02	1.37	6.37
23.62	0.00	1.45	150.9	0.662E-02	1.40	6.40
24.28	0.00	1.47	153.4	0.652E-02	1.43	6.43
24.93	0.00	1.48	155.8	0.642E-02	1.45	6.45
25.59	0.00	1.50	158.2	0.632E-02	1.48	6.48
26.25	0.00	1.51	160.5	0.623E-02	1.51	6.51
26.91	0.00	1.52	162.7	0.615E-02	1.53	6.53
27.57	0.00	1.53	164.9	0.606E-02	1.56	6.56
28.23	0.00	1.54	167.1	0.599E-02	1.58	6.58
28.89	0.00	1.55	169.1	0.591E-02	1.61	6.61
29.55	0.00	1.56	171.1	0.584E-02	1.63	6.63
30.21	0.00	1.57	173.1	0.578E-02	1.65	6.65
30.86	0.00	1.57	175.0	0.571E-02	1.67	6.67
31.52	0.00	1.58	176.8	0.565E-02	1.70	6.70
32.18	0.00	1.58	178.6	0.560E-02	1.72	6.72
32.84	0.00	1.58	180.3	0.555E-02	1.74	6.74

Terminal level in stratified ambient has been reached.
Cumulative travel time = 442.4950 sec

END OF CORJET (MOD110): JET/PLUME NEAR-FIELD MIXING REGION

BEGIN MOD235: LAYER/BOUNDARY/TERMINAL LAYER APPROACH

Control volume inflow:

X	Y	Z	S	C	BV	BH
32.84	0.00	1.58	180.3	0.555E-02	1.74	6.74

Profile definitions:
BV = top-hat thickness, measured vertically
BH = top-hat half-width, measured horizontally in y-direction
ZU = upper plume boundary (Z-coordinate)
ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic average (bulk) dilution
C = average (bulk) concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH	ZU	ZL
31.11	0.00	1.58	180.3	0.555E-02	0.00	0.00	1.58	1.58
32.15	0.00	1.58	180.3	0.555E-02	3.36	4.34	3.26	0.00
33.19	0.00	1.58	184.6	0.542E-02	3.94	9.69	3.55	0.00

** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **
The pollutant concentration in the plume falls below water quality standard or CCC value of 0.470E-02 in the current prediction interval.
This is the spatial extent of concentrations exceeding the water quality standard or CCC value.

34.23	0.00	1.58	231.7	0.432E-02	4.27	9.70	3.72	0.00
35.27	0.00	1.58	273.7	0.365E-02	4.44	9.70	3.81	0.00
36.31	0.00	1.58	289.1	0.346E-02	4.50	9.71	3.83	0.00

Cumulative travel time = 525.1552 sec

END OF MOD235: LAYER/BOUNDARY/TERMINAL LAYER APPROACH

** End of NEAR-FIELD REGION (NFR) **

BEGIN MOD242: BUOYANT TERMINAL LAYER SPREADING

Profile definitions:
BV = top-hat thickness, measured vertically
BH = top-hat half-width, measured horizontally in y-direction
ZU = upper plume boundary (Z-coordinate)
ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic average (bulk) dilution

C = average (bulk) concentration (includes reaction effects, if any)

Plume Stage 1 (not bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
36.31	0.00	1.58	289.1	0.346E-02	4.50	9.71	3.83	0.00
52.59	0.00	1.58	401.9	0.249E-02	1.68	36.17	2.42	0.74
68.87	0.00	1.58	440.6	0.227E-02	1.28	51.99	2.23	0.94
85.15	0.00	1.58	465.9	0.215E-02	1.09	64.64	2.13	1.04
101.43	0.00	1.58	485.2	0.206E-02	0.97	75.52	2.07	1.10
117.71	0.00	1.58	501.2	0.200E-02	0.89	85.22	2.03	1.14
133.99	0.00	1.58	514.9	0.194E-02	0.83	94.07	2.00	1.17
150.27	0.00	1.58	527.2	0.190E-02	0.78	102.25	1.97	1.19
166.55	0.00	1.58	538.5	0.186E-02	0.74	109.90	1.95	1.21
182.83	0.00	1.58	549.0	0.182E-02	0.71	117.12	1.94	1.23
199.11	0.00	1.58	559.0	0.179E-02	0.68	123.96	1.93	1.24
215.38	0.00	1.58	568.7	0.176E-02	0.66	130.49	1.91	1.26
231.66	0.00	1.58	578.0	0.173E-02	0.64	136.75	1.90	1.27
247.94	0.00	1.58	587.2	0.170E-02	0.62	142.78	1.90	1.27
264.22	0.00	1.58	596.3	0.168E-02	0.61	148.59	1.89	1.28
280.50	0.00	1.58	605.2	0.165E-02	0.59	154.22	1.88	1.29
296.78	0.00	1.58	614.2	0.163E-02	0.58	159.69	1.88	1.29
313.06	0.00	1.58	623.2	0.160E-02	0.57	165.00	1.87	1.30
329.34	0.00	1.58	632.2	0.158E-02	0.56	170.18	1.87	1.30
345.62	0.00	1.58	641.2	0.156E-02	0.55	175.25	1.86	1.31
361.90	0.00	1.58	650.4	0.154E-02	0.55	180.20	1.86	1.31
378.18	0.00	1.58	659.6	0.152E-02	0.54	185.05	1.85	1.32
394.46	0.00	1.58	669.0	0.149E-02	0.53	189.82	1.85	1.32
410.74	0.00	1.58	678.4	0.147E-02	0.53	194.50	1.85	1.32
427.02	0.00	1.58	688.0	0.145E-02	0.52	199.10	1.85	1.32
443.29	0.00	1.58	697.7	0.143E-02	0.52	203.64	1.84	1.33
459.57	0.00	1.58	707.5	0.141E-02	0.51	208.11	1.84	1.33
475.85	0.00	1.58	717.5	0.139E-02	0.51	212.53	1.84	1.33
492.13	0.00	1.58	727.6	0.137E-02	0.51	216.89	1.84	1.33
508.41	0.00	1.58	737.9	0.136E-02	0.50	221.20	1.84	1.33
524.69	0.00	1.58	748.3	0.134E-02	0.50	225.46	1.84	1.33
540.97	0.00	1.58	758.8	0.132E-02	0.50	229.69	1.83	1.33
557.25	0.00	1.58	769.5	0.130E-02	0.50	233.87	1.83	1.34
573.53	0.00	1.58	780.3	0.128E-02	0.50	238.02	1.83	1.34
589.81	0.00	1.58	791.2	0.126E-02	0.49	242.14	1.83	1.34
606.09	0.00	1.58	802.3	0.125E-02	0.49	246.22	1.83	1.34
622.37	0.00	1.58	813.5	0.123E-02	0.49	250.28	1.83	1.34
638.65	0.00	1.58	824.8	0.121E-02	0.49	254.31	1.83	1.34
654.92	0.00	1.58	836.3	0.120E-02	0.49	258.31	1.83	1.34
671.20	0.00	1.58	847.9	0.118E-02	0.49	262.29	1.83	1.34
687.48	0.00	1.58	859.6	0.116E-02	0.49	266.26	1.83	1.34
703.76	0.00	1.58	871.5	0.115E-02	0.49	270.20	1.83	1.34
720.04	0.00	1.58	883.5	0.113E-02	0.49	274.12	1.83	1.34
736.32	0.00	1.58	895.6	0.112E-02	0.49	278.03	1.83	1.34
752.60	0.00	1.58	907.8	0.110E-02	0.49	281.92	1.83	1.34
768.88	0.00	1.58	920.1	0.109E-02	0.49	285.80	1.83	1.34
785.16	0.00	1.58	932.6	0.107E-02	0.49	289.66	1.83	1.34
801.44	0.00	1.58	945.1	0.106E-02	0.49	293.51	1.83	1.34
817.72	0.00	1.58	957.8	0.104E-02	0.49	297.35	1.83	1.34
834.00	0.00	1.58	970.6	0.103E-02	0.49	301.18	1.83	1.34
850.28	0.00	1.58	983.4	0.102E-02	0.49	305.00	1.83	1.34

Cumulative travel time = 19905.2246 sec

Plume is ATTACHED to LEFT bank/shore.
Plume width is now determined from LEFT bank/shore.

Plume Stage 2 (bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
850.28	305.00	1.58	983.4	0.102E-02	0.49	610.01	1.83	1.34
873.27	305.00	1.58	998.9	0.100E-02	0.49	614.41	1.83	1.34
896.26	305.00	1.58	1014.3	0.986E-03	0.50	618.85	1.83	1.34
919.26	305.00	1.58	1029.7	0.971E-03	0.50	623.33	1.83	1.33
942.25	305.00	1.58	1044.9	0.957E-03	0.50	627.85	1.84	1.33

965.25	305.00	1.58	1060.1	0.943E-03	0.51	632.39	1.84	1.33
988.24	305.00	1.58	1075.2	0.930E-03	0.51	636.97	1.84	1.33
1011.24	305.00	1.58	1090.3	0.917E-03	0.51	641.58	1.84	1.33
1034.23	305.00	1.58	1105.3	0.905E-03	0.52	646.22	1.84	1.33
1057.23	305.00	1.58	1120.2	0.893E-03	0.52	650.89	1.84	1.32
1080.22	305.00	1.58	1135.1	0.881E-03	0.52	655.59	1.85	1.32
1103.22	305.00	1.58	1150.0	0.870E-03	0.53	660.31	1.85	1.32
1126.21	305.00	1.58	1164.9	0.858E-03	0.53	665.05	1.85	1.32
1149.20	305.00	1.58	1179.7	0.848E-03	0.53	669.82	1.85	1.32
1172.20	305.00	1.58	1194.5	0.837E-03	0.54	674.62	1.85	1.32
1195.19	305.00	1.58	1209.3	0.827E-03	0.54	679.43	1.85	1.32
1218.19	305.00	1.58	1224.1	0.817E-03	0.54	684.27	1.86	1.31
1241.18	305.00	1.58	1238.8	0.807E-03	0.54	689.13	1.86	1.31
1264.18	305.00	1.58	1253.5	0.798E-03	0.55	694.00	1.86	1.31
1287.17	305.00	1.58	1268.3	0.788E-03	0.55	698.90	1.86	1.31
1310.17	305.00	1.58	1283.0	0.779E-03	0.55	703.81	1.86	1.31
1333.16	305.00	1.58	1297.7	0.771E-03	0.55	708.75	1.86	1.31
1356.15	305.00	1.58	1312.4	0.762E-03	0.56	713.70	1.86	1.31
1379.15	305.00	1.58	1327.1	0.754E-03	0.56	718.66	1.86	1.31
1402.14	305.00	1.58	1341.8	0.745E-03	0.56	723.64	1.86	1.30
1425.14	305.00	1.58	1356.5	0.737E-03	0.56	728.64	1.87	1.30
1448.13	305.00	1.58	1371.2	0.729E-03	0.57	733.66	1.87	1.30
1471.13	305.00	1.58	1385.9	0.722E-03	0.57	738.68	1.87	1.30
1494.12	305.00	1.58	1400.7	0.714E-03	0.57	743.72	1.87	1.30
1517.12	305.00	1.58	1415.4	0.707E-03	0.57	748.78	1.87	1.30
1540.11	305.00	1.58	1430.1	0.699E-03	0.57	753.85	1.87	1.30
1563.11	305.00	1.58	1444.9	0.692E-03	0.58	758.93	1.87	1.30
1586.10	305.00	1.58	1459.7	0.685E-03	0.58	764.02	1.87	1.30
1609.09	305.00	1.58	1474.4	0.678E-03	0.58	769.12	1.87	1.29
1632.09	305.00	1.58	1489.2	0.671E-03	0.58	774.24	1.88	1.29
1655.08	305.00	1.58	1504.0	0.665E-03	0.58	779.37	1.88	1.29
1678.08	305.00	1.58	1518.8	0.658E-03	0.59	784.51	1.88	1.29
1701.07	305.00	1.58	1533.7	0.652E-03	0.59	789.66	1.88	1.29
1724.07	305.00	1.58	1548.5	0.646E-03	0.59	794.81	1.88	1.29
1747.06	305.00	1.58	1563.4	0.640E-03	0.59	799.98	1.88	1.29
1770.06	305.00	1.58	1578.2	0.634E-03	0.59	805.16	1.88	1.29
1793.05	305.00	1.58	1593.1	0.628E-03	0.59	810.35	1.88	1.29
1816.04	305.00	1.58	1608.1	0.622E-03	0.60	815.55	1.88	1.29
1839.04	305.00	1.58	1623.0	0.616E-03	0.60	820.75	1.88	1.29
1862.03	305.00	1.58	1637.9	0.611E-03	0.60	825.97	1.88	1.28
1885.03	305.00	1.58	1652.9	0.605E-03	0.60	831.19	1.89	1.28
1908.02	305.00	1.58	1667.9	0.600E-03	0.60	836.42	1.89	1.28
1931.02	305.00	1.58	1682.9	0.594E-03	0.60	841.66	1.89	1.28
1954.01	305.00	1.58	1698.0	0.589E-03	0.61	846.90	1.89	1.28
1977.01	305.00	1.58	1713.0	0.584E-03	0.61	852.16	1.89	1.28
2000.00	305.00	1.58	1728.1	0.579E-03	0.61	857.42	1.89	1.28

Cumulative travel time = 47279.6055 sec

Simulation limit based on maximum specified distance = 2000.00 m.
This is the REGION OF INTEREST limitation.

END OF MOD242: BUOYANT TERMINAL LAYER SPREADING

CORMIX2: Multiport Diffuser Discharges End of Prediction File

2222222222222222222222222222222222222222222222222222222222222222222222222222222222222222

```
CORMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222222222
                    CORMIX MIXING ZONE EXPERT SYSTEM
          Subsystem CORMIX2:  Multiport Diffuser Discharges
                         CORMIX Version 5.0GT
                    HYDRO2 Version 5.0.1.0 December 2007
------------------------------------------------------------------------------
------------------------------------------------------------------------------
CASE DESCRIPTION
 Site name/label:
 Design case:
 FILE NAME:          C:\...5928\cormix\Area10b\8port_lower_flow\wet_u090.prd
 Time stamp:         Thu Oct 20 10:33:02 2016

ENVIRONMENT PARAMETERS (metric units)
 Unbounded section
 HA    =       4.50  HD    =       4.50
 UA    =      0.076  F     =      0.019 USTAR =0.3705E-02
 UW    =      2.000 UWSTAR=0.2198E-02
 Density stratified environment
 STRCND=  A          RHOAM = 1017.3500
 RHOAS = 1017.0000  RHOAB = 1017.7000  RHOAH0= 1017.7000  E     =0.1499E-02

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:      DITYPE= alternating_perpendicular
 BANK  =  LEFT       DISTB =     305.00  YB1   =     300.00  YB2   =     310.00
 LD    =     10.00   NOPEN =          8  SPAC  =       1.43
 D0    =     0.045   A0    =      0.002  H0    =       0.00  SUB0  =       4.50
 Nozzle/port arrangement:   alternating_without_fanning
 GAMMA =      90.00  THETA =       0.00  SIGMA =       0.00  BETA  =      90.00
 U0    =      0.998  Q0    =      0.013        =0.1270E-01
 RHO0  = 1000.0000  DRHO0 =0.1770E+02  GP0   =0.1706E+00
 C0    =0.1000E+01  CUNITS=  mg/l
 IPOLL =  1         KS    =0.0000E+00  KD    =0.0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0    =0.1270E-02  m0    =0.1268E-02  j0    =0.2166E-03  SIGNJ0=       1.0
 Associated 2-d length scales (meters)
 lQ=B  =     0.001  lM    =      0.35  lm    =      0.22
 lmp   =      0.95  lbp   =      1.55  la    =      1.96

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0    =0.1270E-01  M0    =0.1268E-01  J0    =0.2166E-02
 Associated 3-d length scales (meters)
 LQ    =      0.04  LM    =      0.81  Lm    =      1.48  Lb    =      4.93
                                       Lmp   =      1.71  Lbp   =      2.47

NON-DIMENSIONAL PARAMETERS
 FR0   =     67.76  FRD0  =     11.39  R     =     13.13  PL    =       68.
 (slot)             (port/nozzle)

RECOMPUTED SOURCE CONDITIONS FOR ALTERNATING JETS OR RISER GROUPS:
 Momentum fluxes:    m0    =0.8181E-04  M0    =0.8181E-03
 lQ=B  =     0.020  lM    =      0.02  lm    =      0.01  lmp   =      0.38
 LQ    =     0.029  LM    =      0.10  Lm    =      0.38  Lmp   =      0.86
 Properties of riser group with  1 ports/nozzles each:
 U0    =     0.064  D0    =     0.177  A0    =     0.025  THETA =      90.00
 FR0   =      1.11  FRD0  =      0.37  R     =      0.85
 (slot)             (riser group)

FLOW CLASSIFICATION
 22222222222222222222222222222222222222222
 2  Flow class (CORMIX2)      =    MS5    2
 2  Applicable layer depth HS =      4.50  2
 22222222222222222222222222222222222222222

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.1000E+01  CUNITS=  mg/l
```

```
 NTOX  =  0
 NSTD  =  1          CSTD  =0.4700E-02
 REGMZ =  0
 XINT  =   2000.00  XMAX  =   2000.00

X-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the bottom and the diffuser mid-point:
       305.00 m  from the LEFT  bank/shore.
    X-axis points downstream, Y-axis points to left, Z-axis points upward.
NSTEP =  50 display intervals per module
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
BEGIN MOD101: DISCHARGE MODULE (SINGLE PORT AT DIFFUSER CENTER)

      X        Y        Z        S        C        BV       BH
   0.00     0.00     0.00      1.0 0.100E+01   0.09     0.09

END OF MOD101: DISCHARGE MODULE (SINGLE PORT AT DIFFUSER CENTER)
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
BEGIN CORJET (MOD110): JET/PLUME NEAR-FIELD MIXING REGION

 Plume-like motion in linear stratification with strong crossflow.

 Zone of flow establishment:          THETAE=     63.95  SIGMAE=      0.00
  LE    =      0.00  XE    =      0.00  YE    =      0.00  ZE    =      0.00

 Profile definitions:
   BV = Gaussian 1/e (37%) half-width, in vertical plane normal to trajectory
   BH = before merging: Gaussian 1/e (37%) half-width in horizontal plane
                        normal to trajectory
        after merging:  top-hat half-width in horizontal plane
                        parallel to diffuser line
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)

      X        Y        Z        S        C        BV       BH
 Individual jet/plumes before merging:
    0.00     0.00     0.00      1.1 0.931E+00   0.09     0.09
    1.17     0.00     0.20      4.5 0.221E+00   0.12     0.12
    2.34     0.00     0.33      9.7 0.103E+00   0.18     0.18
    3.52     0.00     0.43     15.3 0.654E-01   0.23     0.23
    4.71     0.00     0.49     21.0 0.476E-01   0.28     0.28
    5.89     0.00     0.55     26.8 0.374E-01   0.32     0.32
    7.07     0.00     0.59     32.5 0.308E-01   0.35     0.35
    8.26     0.00     0.63     38.1 0.262E-01   0.38     0.38
    9.44     0.00     0.66     43.7 0.229E-01   0.41     0.41
   10.63     0.00     0.69     49.3 0.203E-01   0.44     0.44
   11.81     0.00     0.72     54.9 0.182E-01   0.47     0.47
   12.99     0.00     0.74     60.6 0.165E-01   0.49     0.49
   14.18     0.00     0.77     66.3 0.151E-01   0.52     0.52
   15.36     0.00     0.80     72.0 0.139E-01   0.54     0.54
   16.55     0.00     0.82     77.8 0.129E-01   0.56     0.56
   17.73     0.00     0.84     83.6 0.120E-01   0.59     0.59
   18.92     0.00     0.87     89.4 0.112E-01   0.61     0.61
   20.10     0.00     0.89     95.2 0.105E-01   0.63     0.63
   21.29     0.00     0.91    101.0 0.990E-02   0.65     0.65
   22.47     0.00     0.94    106.8 0.937E-02   0.67     0.67
   23.66     0.00     0.96    112.5 0.888E-02   0.69     0.69
   24.84     0.00     0.98    118.3 0.845E-02   0.71     0.71
 Merging of individual jet/plumes to form plane jet/plume:
   25.41     0.00     0.99    145.6 0.687E-02   0.90     5.90
   27.21     0.00     1.01    150.9 0.663E-02   0.93     5.93
   28.40     0.00     1.03    154.4 0.648E-02   0.95     5.95
   29.58     0.00     1.05    157.8 0.634E-02   0.97     5.97
   30.77     0.00     1.06    161.2 0.620E-02   1.00     6.00
   31.95     0.00     1.08    164.5 0.608E-02   1.02     6.02
   33.14     0.00     1.09    167.7 0.596E-02   1.04     6.04
```

34.32	0.00	1.11	170.9	0.585E-02	1.06	6.06
35.51	0.00	1.12	174.0	0.575E-02	1.08	6.08
36.69	0.00	1.13	177.1	0.565E-02	1.10	6.10
37.88	0.00	1.15	180.1	0.555E-02	1.12	6.12
39.06	0.00	1.16	183.1	0.546E-02	1.14	6.14
40.25	0.00	1.17	185.9	0.538E-02	1.16	6.16
41.43	0.00	1.19	188.7	0.530E-02	1.18	6.18
42.62	0.00	1.20	191.5	0.522E-02	1.20	6.20
43.80	0.00	1.21	194.2	0.515E-02	1.21	6.21
44.99	0.00	1.22	196.8	0.508E-02	1.23	6.23
46.17	0.00	1.23	199.3	0.502E-02	1.25	6.25
47.36	0.00	1.24	201.8	0.496E-02	1.26	6.26
48.54	0.00	1.24	204.2	0.490E-02	1.28	6.28
49.73	0.00	1.25	206.5	0.484E-02	1.30	6.30
50.92	0.00	1.26	208.8	0.479E-02	1.31	6.31
52.10	0.00	1.27	210.9	0.474E-02	1.33	6.33

** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **
The pollutant concentration in the plume falls below water quality standard or CCC value of 0.470E-02 in the current prediction interval.
This is the spatial extent of concentrations exceeding the water quality standard or CCC value.

53.28	0.00	1.27	213.0	0.469E-02	1.34	6.34
54.47	0.00	1.28	215.1	0.465E-02	1.35	6.35
55.66	0.00	1.28	217.0	0.461E-02	1.37	6.37
56.84	0.00	1.28	218.9	0.457E-02	1.38	6.38
58.03	0.00	1.29	220.7	0.453E-02	1.39	6.39
59.21	0.00	1.29	222.4	0.450E-02	1.40	6.40

Terminal level in stratified ambient has been reached.
Cumulative travel time = 625.3839 sec

END OF CORJET (MOD110): JET/PLUME NEAR-FIELD MIXING REGION

BEGIN MOD235: LAYER/BOUNDARY/TERMINAL LAYER APPROACH

Control volume inflow:

X	Y	Z	S	C	BV	BH
59.21	0.00	1.29	222.4	0.450E-02	1.40	6.40

Profile definitions:
BV = top-hat thickness, measured vertically
BH = top-hat half-width, measured horizontally in y-direction
ZU = upper plume boundary (Z-coordinate)
ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic average (bulk) dilution
C = average (bulk) concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH	ZU	ZL
57.81	0.00	1.29	222.4	0.450E-02	0.00	0.00	1.29	1.29
58.65	0.00	1.29	222.4	0.450E-02	2.78	3.49	2.68	0.00
59.49	0.00	1.29	227.4	0.440E-02	3.26	7.80	2.92	0.00
60.33	0.00	1.29	281.9	0.355E-02	3.54	7.80	3.06	0.00
61.18	0.00	1.29	330.6	0.303E-02	3.68	7.81	3.13	0.00
62.02	0.00	1.29	348.3	0.287E-02	3.73	7.81	3.15	0.00

Cumulative travel time = 662.3197 sec

END OF MOD235: LAYER/BOUNDARY/TERMINAL LAYER APPROACH

** End of NEAR-FIELD REGION (NFR) **

BEGIN MOD242: BUOYANT TERMINAL LAYER SPREADING

Profile definitions:
BV = top-hat thickness, measured vertically
BH = top-hat half-width, measured horizontally in y-direction
ZU = upper plume boundary (Z-coordinate)
ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic average (bulk) dilution

C = average (bulk) concentration (includes reaction effects, if any)

Plume Stage 1 (not bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
62.02	0.00	1.29	348.3	0.287E-02	3.73	7.81	3.15	0.00
91.70	0.00	1.29	486.9	0.205E-02	1.37	29.65	1.98	0.60
121.39	0.00	1.29	535.0	0.187E-02	1.05	42.68	1.81	0.77
151.08	0.00	1.29	567.8	0.176E-02	0.89	53.11	1.74	0.84
180.76	0.00	1.29	594.6	0.168E-02	0.80	62.11	1.69	0.89
210.45	0.00	1.29	618.5	0.162E-02	0.74	70.19	1.66	0.92
240.14	0.00	1.29	641.1	0.156E-02	0.69	77.60	1.63	0.94
269.82	0.00	1.29	663.3	0.151E-02	0.66	84.51	1.62	0.96
299.51	0.00	1.29	685.6	0.146E-02	0.63	91.04	1.60	0.97
329.20	0.00	1.29	708.4	0.141E-02	0.61	97.27	1.59	0.98
358.88	0.00	1.29	731.8	0.137E-02	0.59	103.25	1.59	0.99
388.57	0.00	1.29	755.9	0.132E-02	0.58	109.03	1.58	1.00
418.26	0.00	1.29	780.9	0.128E-02	0.57	114.65	1.57	1.00
447.94	0.00	1.29	806.8	0.124E-02	0.56	120.14	1.57	1.01
477.63	0.00	1.29	833.5	0.120E-02	0.55	125.52	1.57	1.01
507.32	0.00	1.29	861.2	0.116E-02	0.55	130.81	1.56	1.01
537.00	0.00	1.29	889.6	0.112E-02	0.55	136.02	1.56	1.02
566.69	0.00	1.29	919.0	0.109E-02	0.54	141.17	1.56	1.02
596.38	0.00	1.29	949.1	0.105E-02	0.54	146.27	1.56	1.02
626.06	0.00	1.29	980.1	0.102E-02	0.54	151.32	1.56	1.02
655.75	0.00	1.29	1011.8	0.988E-03	0.54	156.35	1.56	1.02
685.44	0.00	1.29	1044.2	0.958E-03	0.54	161.34	1.56	1.02
715.12	0.00	1.29	1077.3	0.928E-03	0.54	166.31	1.56	1.02
744.81	0.00	1.29	1111.1	0.900E-03	0.54	171.26	1.56	1.02
774.50	0.00	1.29	1145.5	0.873E-03	0.54	176.20	1.56	1.02
804.18	0.00	1.29	1180.6	0.847E-03	0.54	181.13	1.56	1.02
833.87	0.00	1.29	1216.2	0.822E-03	0.55	186.05	1.56	1.02
863.56	0.00	1.29	1252.4	0.798E-03	0.55	190.96	1.56	1.02
893.24	0.00	1.29	1289.2	0.776E-03	0.55	195.88	1.56	1.01
922.93	0.00	1.29	1326.5	0.754E-03	0.55	200.79	1.57	1.01
952.62	0.00	1.29	1364.3	0.733E-03	0.55	205.70	1.57	1.01
982.30	0.00	1.29	1402.7	0.713E-03	0.56	210.61	1.57	1.01
1011.99	0.00	1.29	1441.5	0.694E-03	0.56	215.52	1.57	1.01
1041.68	0.00	1.29	1480.8	0.675E-03	0.56	220.44	1.57	1.01
1071.36	0.00	1.29	1520.6	0.658E-03	0.56	225.36	1.57	1.01
1101.05	0.00	1.29	1560.8	0.641E-03	0.57	230.28	1.57	1.01
1130.74	0.00	1.29	1601.5	0.624E-03	0.57	235.21	1.57	1.00
1160.42	0.00	1.29	1642.6	0.609E-03	0.57	240.15	1.57	1.00
1190.11	0.00	1.29	1684.1	0.594E-03	0.57	245.09	1.58	1.00
1219.80	0.00	1.29	1726.1	0.579E-03	0.58	250.04	1.58	1.00
1249.48	0.00	1.29	1768.4	0.565E-03	0.58	255.00	1.58	1.00
1279.17	0.00	1.29	1811.2	0.552E-03	0.58	259.97	1.58	1.00
1308.86	0.00	1.29	1854.3	0.539E-03	0.58	264.94	1.58	1.00
1338.54	0.00	1.29	1897.8	0.527E-03	0.59	269.92	1.58	1.00
1368.23	0.00	1.29	1941.7	0.515E-03	0.59	274.90	1.58	0.99
1397.92	0.00	1.29	1986.0	0.504E-03	0.59	279.90	1.59	0.99
1427.60	0.00	1.29	2030.7	0.492E-03	0.60	284.90	1.59	0.99
1457.29	0.00	1.29	2075.7	0.482E-03	0.60	289.91	1.59	0.99
1486.98	0.00	1.29	2121.0	0.471E-03	0.60	294.93	1.59	0.99
1516.66	0.00	1.29	2166.7	0.462E-03	0.60	299.96	1.59	0.99
1546.35	0.00	1.29	2212.8	0.452E-03	0.61	305.00	1.59	0.99

Cumulative travel time = 20193.0273 sec

Plume is ATTACHED to LEFT bank/shore.
Plume width is now determined from LEFT bank/shore.

Plume Stage 2 (bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
1546.35	305.00	1.29	2212.8	0.452E-03	0.61	609.99	1.59	0.99
1555.42	305.00	1.29	2225.2	0.449E-03	0.61	611.27	1.59	0.98
1564.50	305.00	1.29	2237.5	0.447E-03	0.61	612.55	1.59	0.98
1573.57	305.00	1.29	2249.8	0.444E-03	0.61	613.84	1.60	0.98
1582.64	305.00	1.29	2262.1	0.442E-03	0.61	615.14	1.60	0.98

RNTPC Paper No. Y/I-DB/3
For Consideration by
the Rural and New Town
Planning Committee
on 26.8.2016

APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE

APPLICATION NO. Y/I-DB/3
(for 2nd deferment)

Applicant	:	Hong Kong Resort Company Limited represented by Masterplan Limited
Site	:	Area 10b, Lot 385 RP & Ext. (Part) in D.D. 352, Discovery Bay
Site Area	:	62,875 m^2 (about) (including 14,438 m^2 of area not covered by the Outline Zoning Plan)
Lease	:	Lot No. 385 R.P. in D.D. 352 and the extensions thereto
Plan	:	Approved Discovery Bay Outline Zoning Plan (OZP) No. S/I-DB/4
Zoning	:	"Other Specified Uses" ("OU") annotated "Staff Quarters (1)", "Service Area", "Dangerous Goods Store/Liquefied Petroleum Gas (LPG) Store", "Pier (3)", "Petrol Filling Station (PFS)" and "Marina" and "Government , Institution or Community" ("G/IC")
Proposed Amendment	:	To rezone the application site from "OU(Staff Quarters(1))", "OU(Service Area)", "OU(Dangerous Goods Store/LPG Store)", "OU(Pier(3))", "OU(PFS)", "OU(Marina)" and "G/IC" to "Residential (Group C) 13" ("R(C)13"), "G/IC", "OU(Residential Above Service Area)" and "OU(Promenade)" and to extend the OZP boundary beyond the existing seawall and zone it as "R(C)13" and "OU(Promenade)"

1. Background

1.1 The applicant proposes to rezone the application site (the Site) **(Plan Z-1)** from "OU(Staff Quarters(1))", "OU(Service Area)", "OU(Dangerous Goods Store/ LPG Store)", "OU (Pier(3))", "OU (PFS)" and "OU (Marina)" and "G/IC" to "R(C)13", "G/IC", "OU(Residential Above Service Area)" and "OU (Promenade)" and to extend the OZP boundary beyond the existing seawall and zone it as "R(C)13" and "OU (Promenade)". The proposed "R(C)13" zone is subject to development restrictions of maximum domestic gross floor area (GFA) of 43,300m^2 and maximum building height (BH) of 18 storeys (77mPD) (including rooftop structures), and the proposed "OU(Residential Above Service Area)" is subject to development restrictions of maximum domestic GFA of 24,200m^2 and maximum BH of 19 storeys (86mPD) (including one podium level and rooftop structures). The proposed rezoning is intended to facilitate a low to medium-density residential development on top of a podium level of service area at the Site.

1.2 On 13.5.2016, the Committee agreed to defer a decision on the application for two months, as requested by the applicant, to allow time for the applicant to prepare further information to address the comments of the relevant departments. The application is scheduled for consideration by the Committee on 26.8.2016.

2. Request for Deferment

On 5.8.2016, the applicant's representative wrote to the Secretary of the Town Planning Board (the Board) and requested the Board to defer making a decision on the application for two months so as to allow time for reviewing and responding to the latest departmental comments **(Appendix I)**.

3. Planning Department's Views

3.1 The application has been deferred once for two months at the request of the applicant to allow more time to address the comments of the relevant departments. Since the first deferment on 13.5.2016, the applicant has submitted a revised Landscape Master Plan, Traffic Study, Environmental Study and additional photomontages on 13.6.2016 to support the application. Nevertheless, the applicant needs more time to address the further comments raised by the concerned departments.

3.2 The Planning Department has no objection to the request for deferment as the justifications for deferment meet the criteria for deferment as set out in the Town Planning Board Guidelines on Deferment of Decision on Representations, Comments, Further Representations and Applications made under the Town Planning Ordinance (TPB PG-No. 33) in that the applicant needs more time to prepare further information in response to departmental comments, the deferment period is not indefinite and the deferment would not affect the interests of other relevant parties.

3.3 Should the Committee agree to defer a decision on the application, the application will be submitted to the Committee for consideration within three months upon receipt of further information from the applicant. If the further information submitted by the applicant is not substantial and can be processed within a shorter time, the application could be submitted to an earlier meeting for the Committee's consideration. Since it is the second deferment of the application, the applicant should be advised that the Committee has allowed a total of four months for preparation of submission of further information, and no further deferment would be granted unless under very special circumstances.

4. Decision Sought

The Committee is invited to consider whether or not to accede to the applicant's request for deferment. If the request is not acceded to, the application will be submitted to the Committee for consideration at the next meeting.

5. Attachments

Appendix I	Letter dated 5.8.2016 from the applicant's representative
Plan Z-1	Location plan

PLANNING DEPARTMENT
AUGUST 2016

MASTERPLAN LIMITED
Planning and Development Advisors
領賢規劃顧問有限公司

Your Ref: Y/I-DB/3

The Secretariat
Town Planning Board
15/F, North Point Government Offices
333 Java Road, North Point
Hong Kong

5 August 2016

By Fax

Dear Sir,

Section 12A Application No.Y/I-DB/3
For Optimisation of Land Uses at Area 10b, Discovery Bay
Request to Defer

I refer to the abovementioned application which is currently being processed and scheduled to be considered by Town Planning Board on 26 August 2016. I am writing to request to defer the consideration of the application.

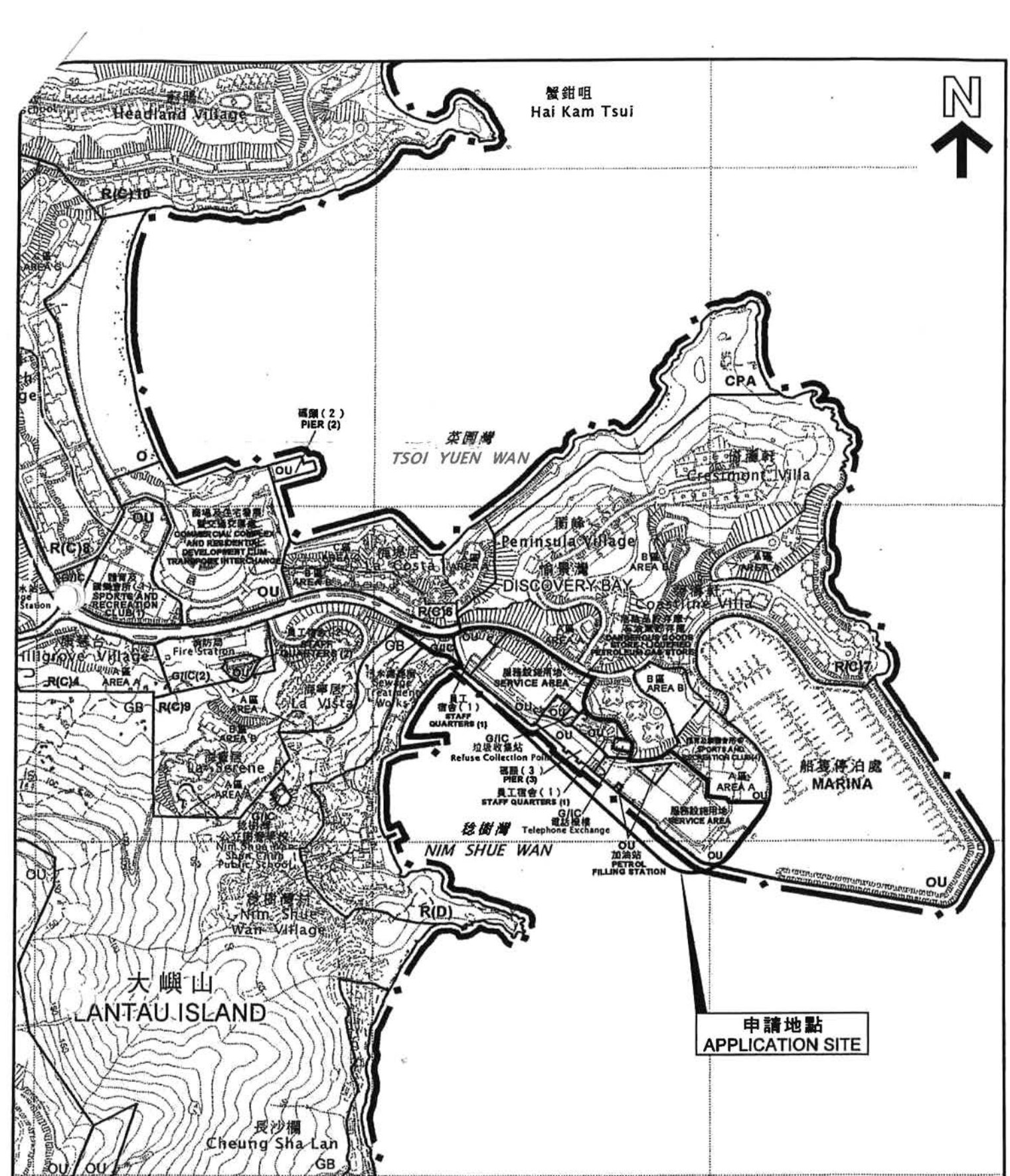
We have received departmental comments on the application made available by the District Planning Office on 25 and 28 July 2016. We are reviewing the departmental comments and are currently formulating a response including quantitative assessment to address the concerns.

In accordance with Town Planning Board Guideline No.33, I am requesting the consideration of the application be deferred for two months to allow for the review and response to the departmental comments. The deferment is unlikely to affect the right or interest of the concerned parties.

Yours faithfully,

Cynthia Chan
For and on behalf of
Masterplan Limited

cc. DPO/SKI (Attn: Helena Pang) Email
Client & Consultants



申請地點界線只作識別用
APPLICATON SITE BOUNDARY FOR IDENTIFICATION PURPOSE ONLY

本摘要圖於2016年8月9日擬備，所根據的資料為於2005年2月1日核准的分區計劃大綱圖編號S/I-DB/4
EXTRACT PLAN PREPARED ON 9.8.2016 BASED ON OUTLINE ZONING PLAN No. S/I-DB/4 APPROVED ON 1.2.2005

位置圖 LOCATION PLAN

把「其他指定用途」註明「員工宿舍(1)」、「其他指定用途」註明「服務設施用地」、「其他指定用途」註明「危險品貯存庫／石油氣貯存庫」、「其他指定用途」註明「碼頭(3)」、「其他指定用途」註明「加油站」、「其他指定用途」註明「船隻停泊處」及「政府、機構或社區」地帶改劃為「住宅(丙類)13」、「政府、機構或社區」、「其他指定用途」註明「服務設施用地上設住宅」以及「其他指定用途」註明「海濱長廊」，及延伸分區計劃大綱圖範圍至超出現有海堤並劃為「住宅(丙類)13」及「其他指定用途」註明「海濱長廊」地帶
愉景灣第10b區丈量約份第352約地段第385號餘段及增批部分(部分)

TO REZONE THE APPLICATION SITE FROM "OTHER SPECIFIED USES" ANNOTATED "STAFF QUARTERS (1)", "OTHER SPECIFIED USES" ANNOTATED "SERVICE AREA", "OTHER SPECIFIED USES" ANNOTATED "DANGEROUS GOODS STORE/LIQUEFIED PETROLEUM GAS STORE", "OTHER SPECIFIED USES" ANNOTATED "PIER (3)", "OTHER SPECIFIED USES" ANNOTATED "PETROL FILLING STATION", "OTHER SPECIFIED USES" ANNOTATED "MARINA" AND "GOVERNMENT, INSTITUTION OR COMMUNITY" TO "RESIDENTIAL (GROUP C) 13", "GOVERNMENT, INSTITUTION OR COMMUNITY", "OTHER SPECIFIED USES" ANNOTATED "RESIDENTIAL ABOVE SERVICE AREA" AND "OTHER SPECIFIED USES" ANNOTATED "PROMENADE" AND TO EXTEND THE OUTLINE ZONING PLAN BOUNDARY BEYOND THE EXISTING SEAWALL AND ZONE IT AS "RESIDENTIAL (GROUP C) 13" AND "OTHER SPECIFIED USES" ANNOTATED "PROMENADE"
AREA 10b, LOT 385 RP & EXT. (PART) IN D.D. 352, DISCOVERY BAY

SCALE 1 : 7 500 比例尺

米 METRES 100 0 100 200 300 米 METRES

規劃署
PLANNING DEPARTMENT

參考編號 REFERENCE No.
Y/I-DB/3

圖 PLAN
Z - 1